

The BOG



Willow Lake, Plumas County <http://creagrass.home.montereybay.com/CA-PLU-WillowLake.html>

Goals for Today

- Update the Review Panel on developments over the past year
- 2014: Second draft Cleanest Lakes Report
- 2015 Bass data report
- 2016 Lakes progress report
- 2017 Bass sampling plan
- 2018 Bight sampling plan
- Portal update
- Bioaccumulation summary
- Make sure we hear from the Panel
 - Format for each item: Presentation, Panel, general discussion



Item 2: Information: General Update

- Desired outcome: Informed committee.



Item 2: Updates

- SWAMP
 - SWAMP Strategic Review
 - Developing the scope and budget for the next 3-year contract (FY 17/18 - 19/20)
 - Newsletter (Coastal advisory, WNAMS paper, Bass plan, Wildlife study)
 - SWAMP Symposium in June
 - WPCL going out of business
- Monitoring Council
- State Water Board
 - Statewide Fish Tissue Mercury Objectives
 - Statewide Mercury Control Program for Reservoirs



Table i. Summary of the Mercury Water Quality Objectives

Objective Type	Beneficial Uses	Objective
Sport Fish	Commercial and Sport Fishing; Wildlife Habitat ^a ; Marine Habitat	0.2 mg/kg in highest trophic level fish, 150-500 mm (millimeters)
Tribal Subsistence	Tribal Subsistence Fishing	0.04 mg/kg in 70% trophic level 3 fish and 30% trophic level 4 fish, 150-500 mm
Subsistence	Subsistence Fishing	Waters... shall be maintained free of mercury at concentrations which accumulate in fish and cause adverse biological, reproductive, or neurological effects. The fish consumption rate used to evaluate this objective shall be derived from water body and population-specific data and information of the subsistence fishers' rate of and form of (e.g. whole, fillet with skin, skinless fillet) fish consumption
Prey Fish	Wildlife Habitat ^a ; Marine Habitat, (where there are no trophic level 4 fish)	0.05 mg/kg in fish 50-150 mm
California Least Tern Prey Fish	Wildlife Habitat ^a , Marine Habitat, Rare, Threatened, or Endangered Species (where California least tern habitat	0.03 mg/kg in fish less than 50 mm

Multi-Year Workplan

	Actual				Planning								
Fiscal Year	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/2022	2022/2023	2023/2024	2024/2025	2025/2026
Sampling Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
	Clean Lakes	Bass Lakes 1.1	Lake Info Gaps	Bass Lakes 1.2	Coast 2.1	Bass Lakes 1.3	Coast 2.2	Bass Lakes 1.4	Coast 2.3	Bass Lakes 1.5	High Trout Lakes?	Bass Lakes 2.1	Rivers and Streams (Bass & High Trout)
Project management and coordination, peer review: SWAMP and CWQMC (SFEI)	\$100,000	\$100,000	\$100,000	\$100,000	\$85,000	\$85,000	\$85,000	\$85,000	\$85,000	\$85,000	\$85,000	\$85,000	\$85,000
Project management and coordination, monitoring design, data validation, infrastructure: SWAMP (MPSL)	\$76,000	\$75,000	\$75,000	\$75,000	\$75,000	\$70,000	\$65,000	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000	\$75,000
Clean Lakes Study	\$263,457												
Status and Trend Monitoring (Lakes, Coast, Rivers)		\$280,000	\$360,000	\$360,000	\$339,789	\$424,789	\$295,000	\$300,000	\$300,000	\$300,000	\$300,000	\$300,000	\$300,000
Coastal Fish (Round 2)													
Statewide Synthesis Report (SWAMP + Other)													
Upload, Maintenance, Minor Enhancements	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000						
UI/UX Survey and Add Functionality													
Upgrade Code: Open Source Base Map			\$30,000										
Cyanotoxin White Paper	\$50,000												
Cyanotoxin Tissue Monitoring													
Cyanobacteria		\$150,000	\$100,000	\$100,000									
?? - opportunistic partnering?													
Anticipate this being covered by others													
SQO	\$7,500												
TOTAL	\$511,957	\$620,000	\$680,000	\$650,000									
Available for BOG					\$514,789	\$594,789	\$460,000						

Long-term Sampling Plan

X = funded by SWAMP, O = funded by another program

General water body category	Specific category (numbers are approximate)	Revisit frequency for each water body	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Lakes	1) Bass Lakes (n=190) (Statewide Core Monitoring)	10 yr	X		X		X		X		X		X		X		X		X	
	2) "New" Bass Lakes	Screening		X																
	3) Bass Lakes - with mgmt actions	1 yr			O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	
	4) Trout Lakes - >0.2 ppm (n=5)	10 yr												X						
	5) Trout Lakes - <0.2 ppm (n=90)	20 yr												X						
	6) "New" Trout Lakes	Screening		X																
Rivers and Streams	7) Bass sites in Delta (n=6)	1 yr		O	O	O	O	O	O	O	O	O	O		O		O		O	
	8) Other bass/sucker sites (n=10)	10 yr										X								
	9) Trout Sites - <0.2 ppm (n=50)	20 yr																		
	10) Trout Sites - >0.2 ppm (n=10)	10 yr										X								
Coast	11) SF Bay	5 yr					O					O					O			
	12) SC Bight (n=27)	10 yr				XO										O				
	13) Other coast zones (n=35)	10 yr				X		X		X						X		X		X

Item 3: Discussion: Draft Report on the Clean Lakes Study

- Desired outcome: Obtain input on the report from the Review Panel and stakeholders via a group discussion.
- Written comments on the report requested by May 4.



What's New

1. The draft is done
2. Revised assessment approach
3. Region 7 Study data included
4. The “Why” data: prey fish, water, sediment

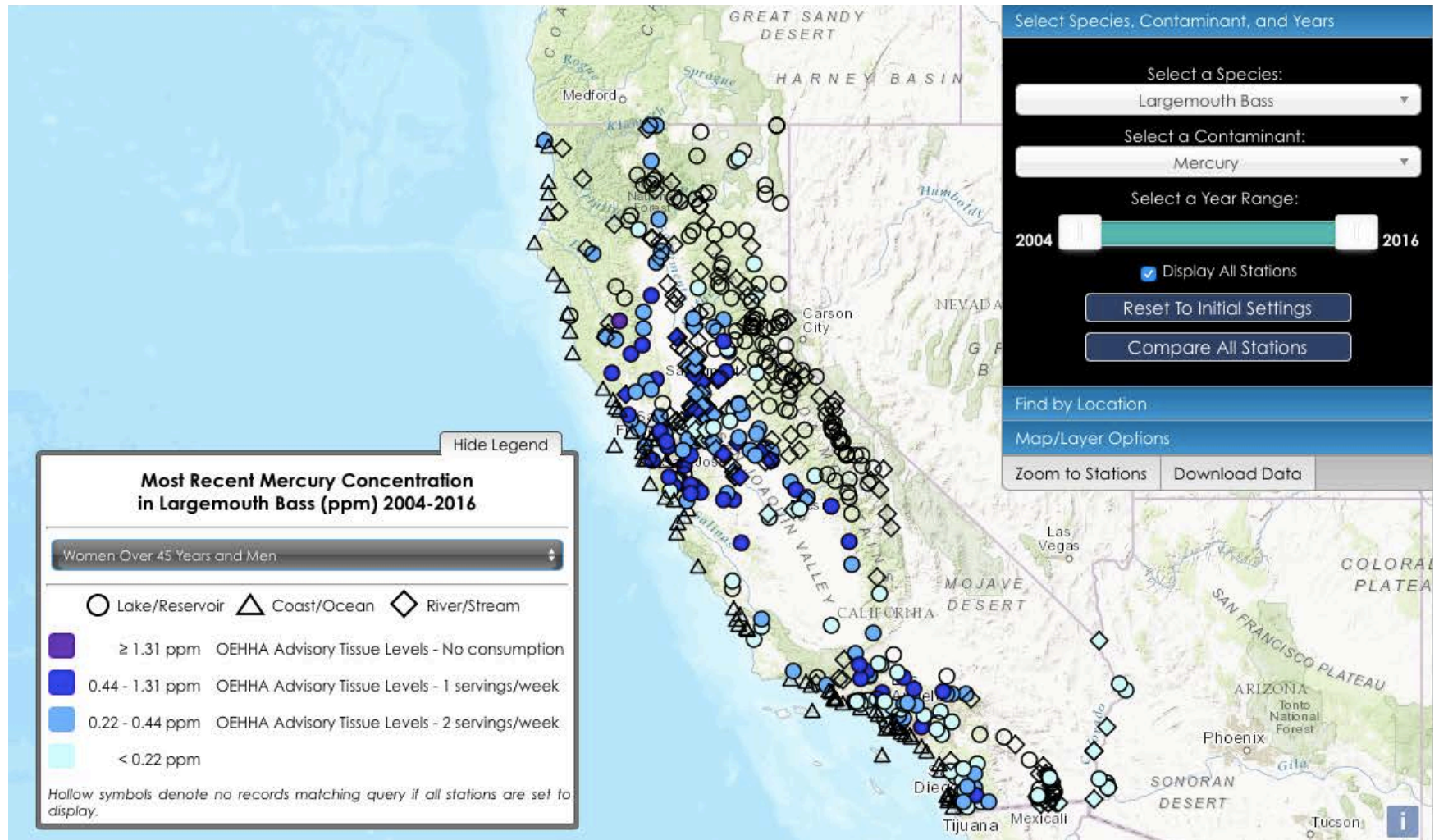


Subcommittee on Communicating SWAMP Data to the Public

1. Subcommittee met in January 2016
2. Agreed on criteria
 - Simple, easy to understand
 - Convey the right message (not be misleading)
 - Consistent with existing or future OEHHA consumption advice



Revised Portal Opening Map – Less-sensitive Population



Purpose of the Technical Report

- Document and allow peer review of the technical foundation for the other communication products for these studies
 - The Portal
 - Fact sheet(s)
 - Press release



Discussion/Review Points

1. Was the study and the analysis technically sound?
2. Did we answer the management questions?
3. What important information gaps remain?



Clean(est) Lakes Study: Background

- Smaller-scale study –
a lower funding year –
\$260K for sampling and
analysis
 - Narrow scope for
analytes



Management Questions

1. (Primary) Which popular lakes in California can be confirmed to have relatively low concentrations of contaminants in sport fish?
2. (Secondary) Why do some lakes have relatively low concentrations of methylmercury in sport fish?
3. (Secondary) Did the 2007-8 survey accurately characterize the status of lakes in which only rainbow trout were collected?



Management Questions

1. (Primary) Which popular lakes in California can be confirmed to have relatively low concentrations of contaminants in sport fish?
 - Definition of “confirmed”
 - Repeated observation across years
 - A primary mercury indicator species and a primary organics indicator species in both rounds
 - Focus on bass lakes



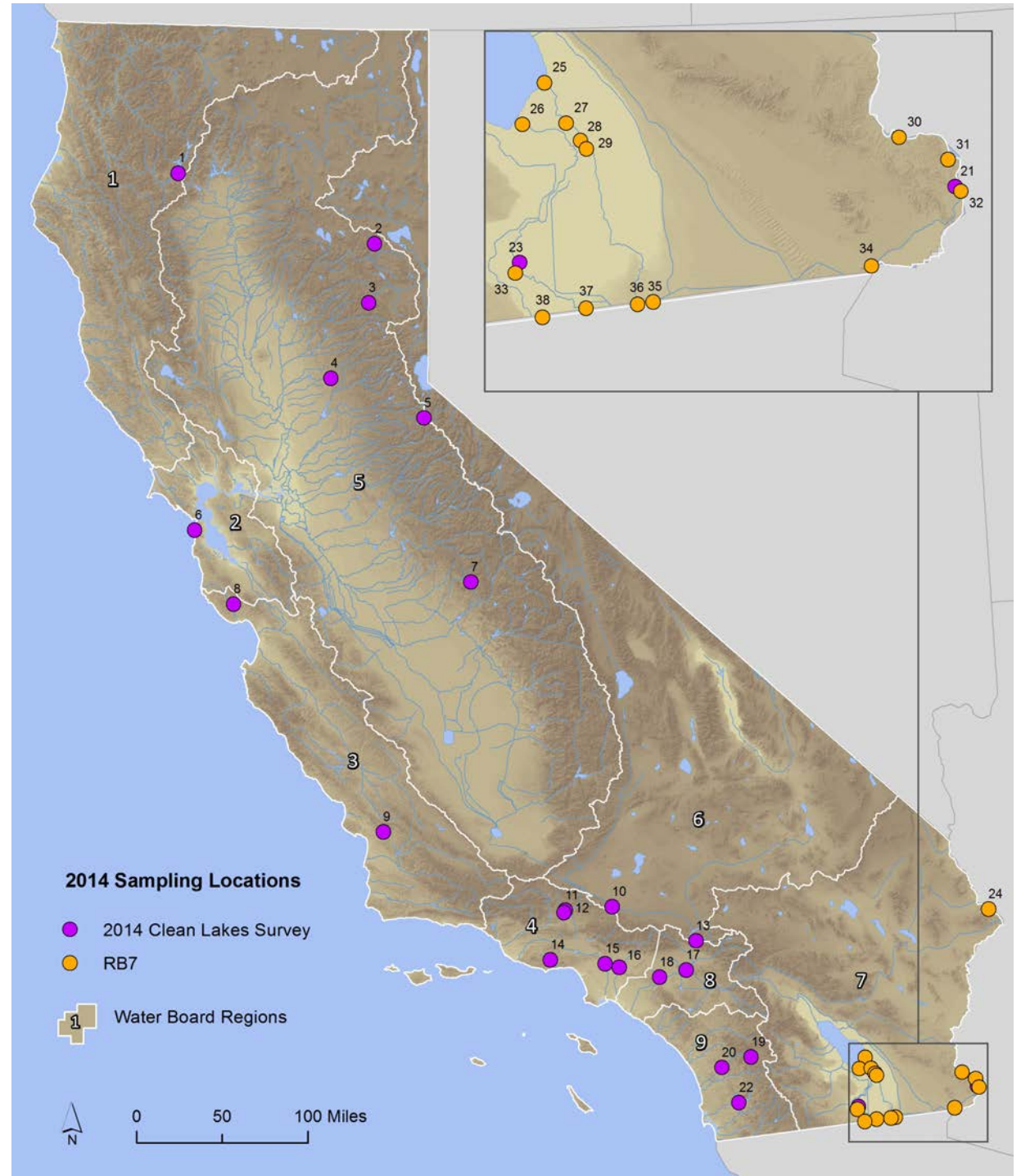
Coordination and Partners

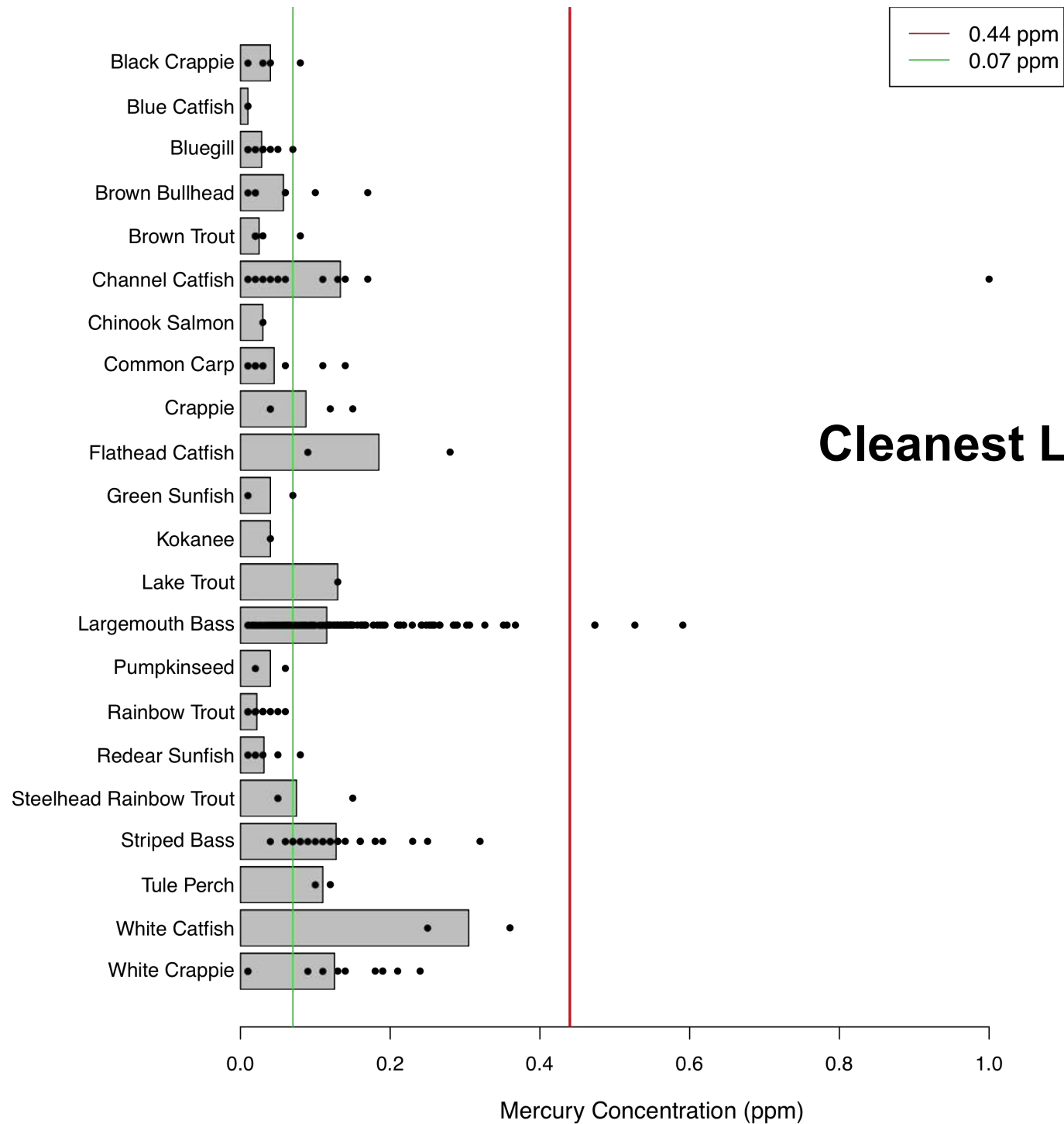
- \$169K of additional work
- Region 4
- Region 7
- USGS-WI
- USGS-Corvallis
- USGS-Menlo Park



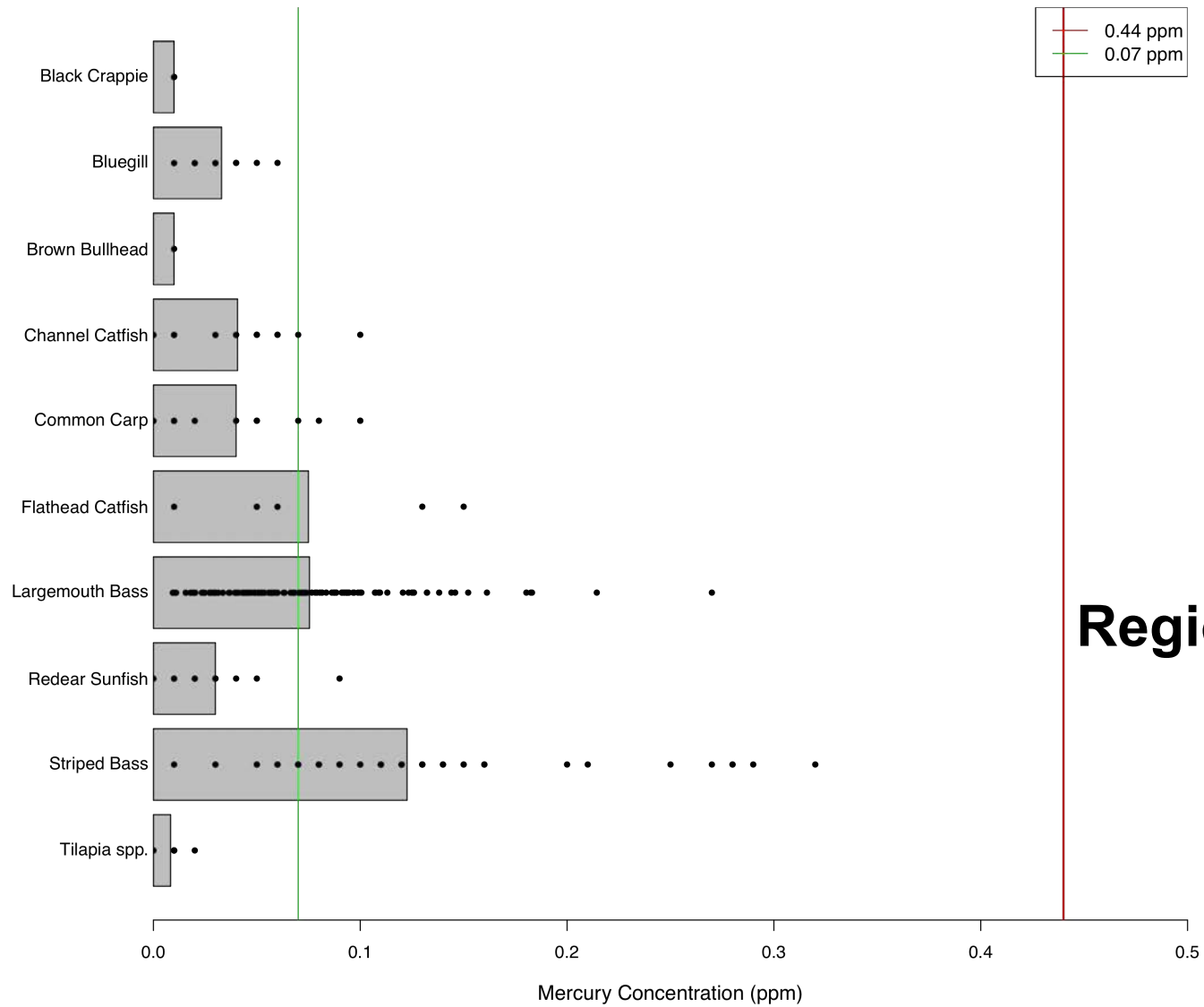
Lakes Sampled

- Clean Lakes Study – 23 lakes
- Region 7 Study – 6 lakes (8 river sites)





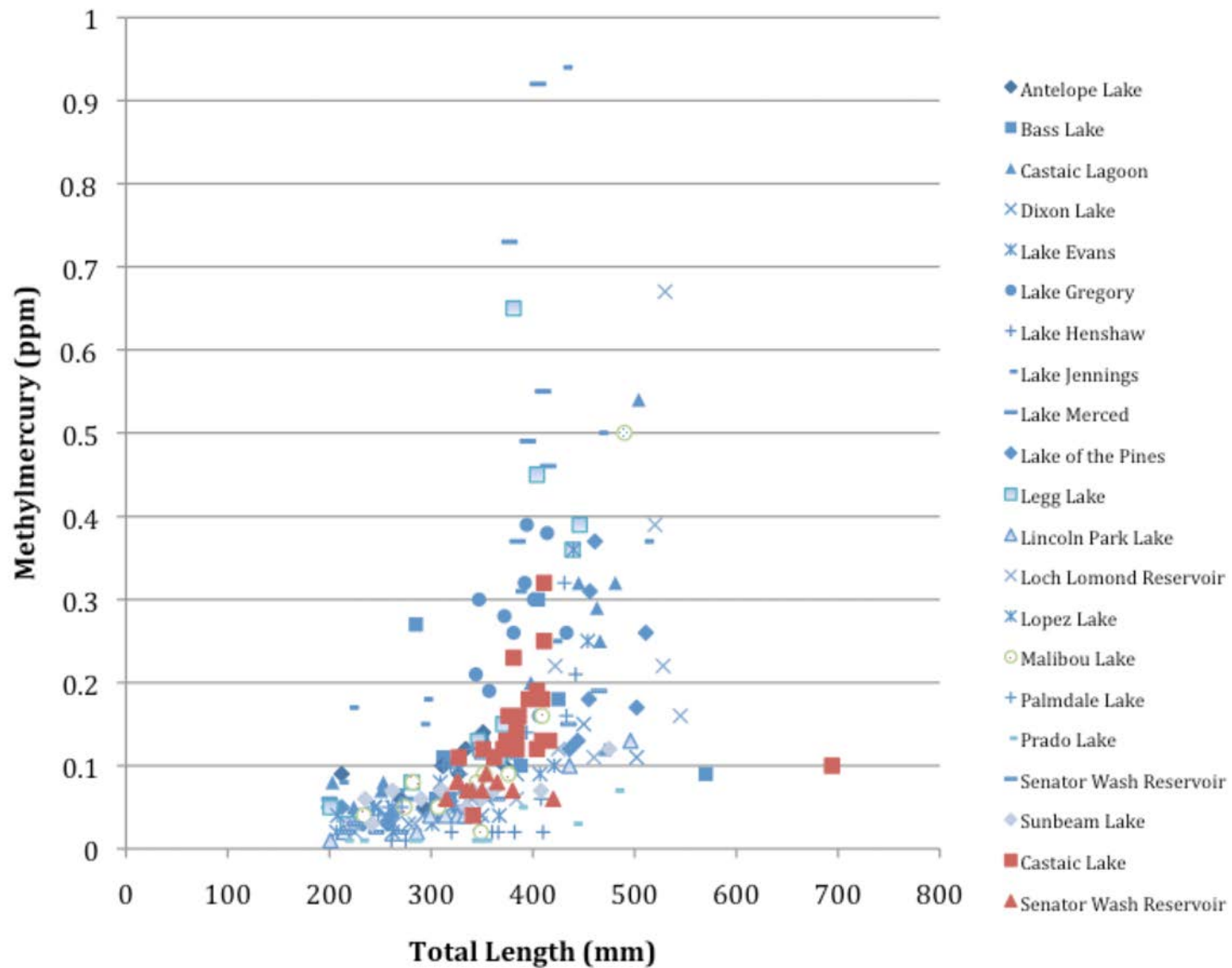
Cleanest Lakes



Region 7

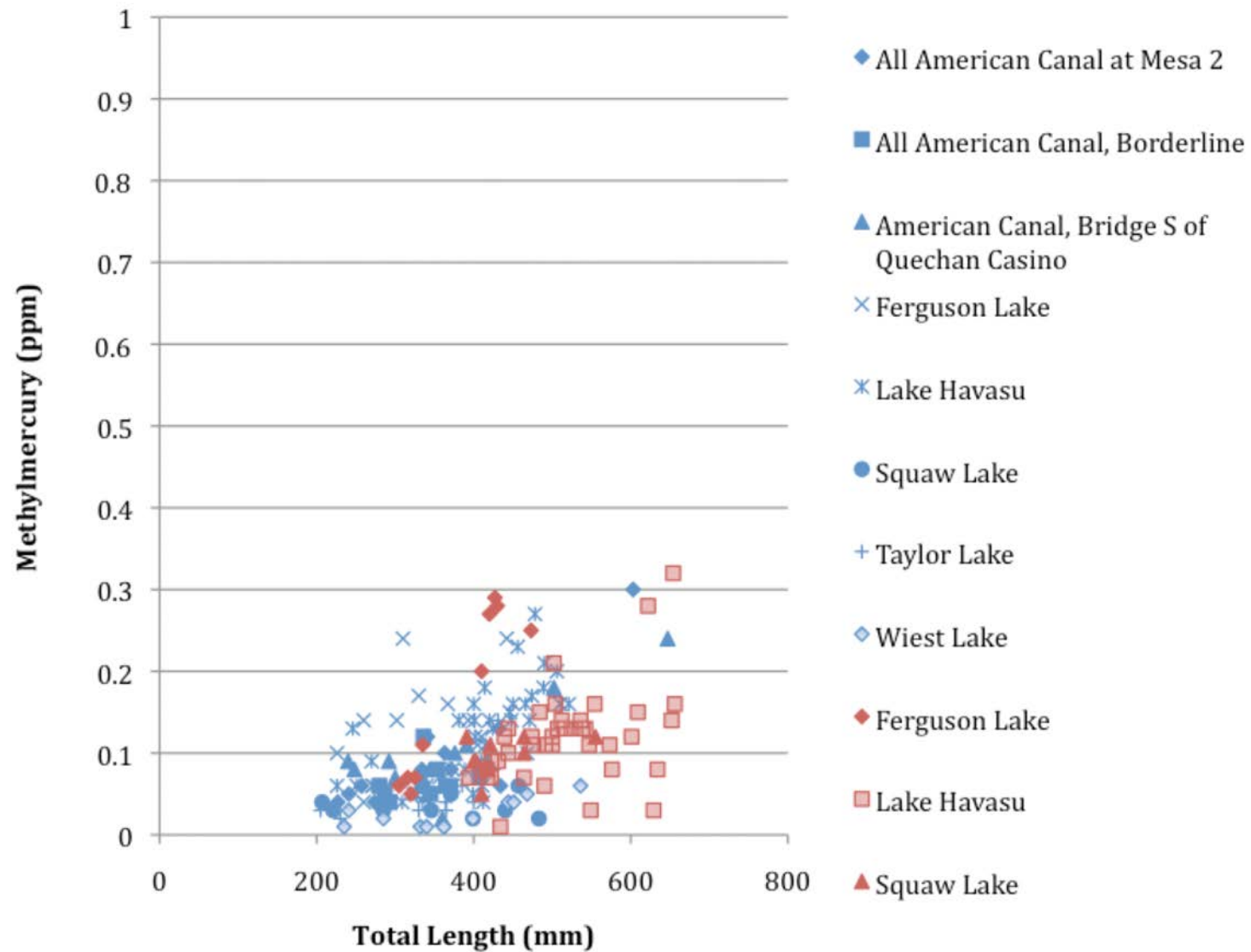
Cleanest Lakes

Bass Species

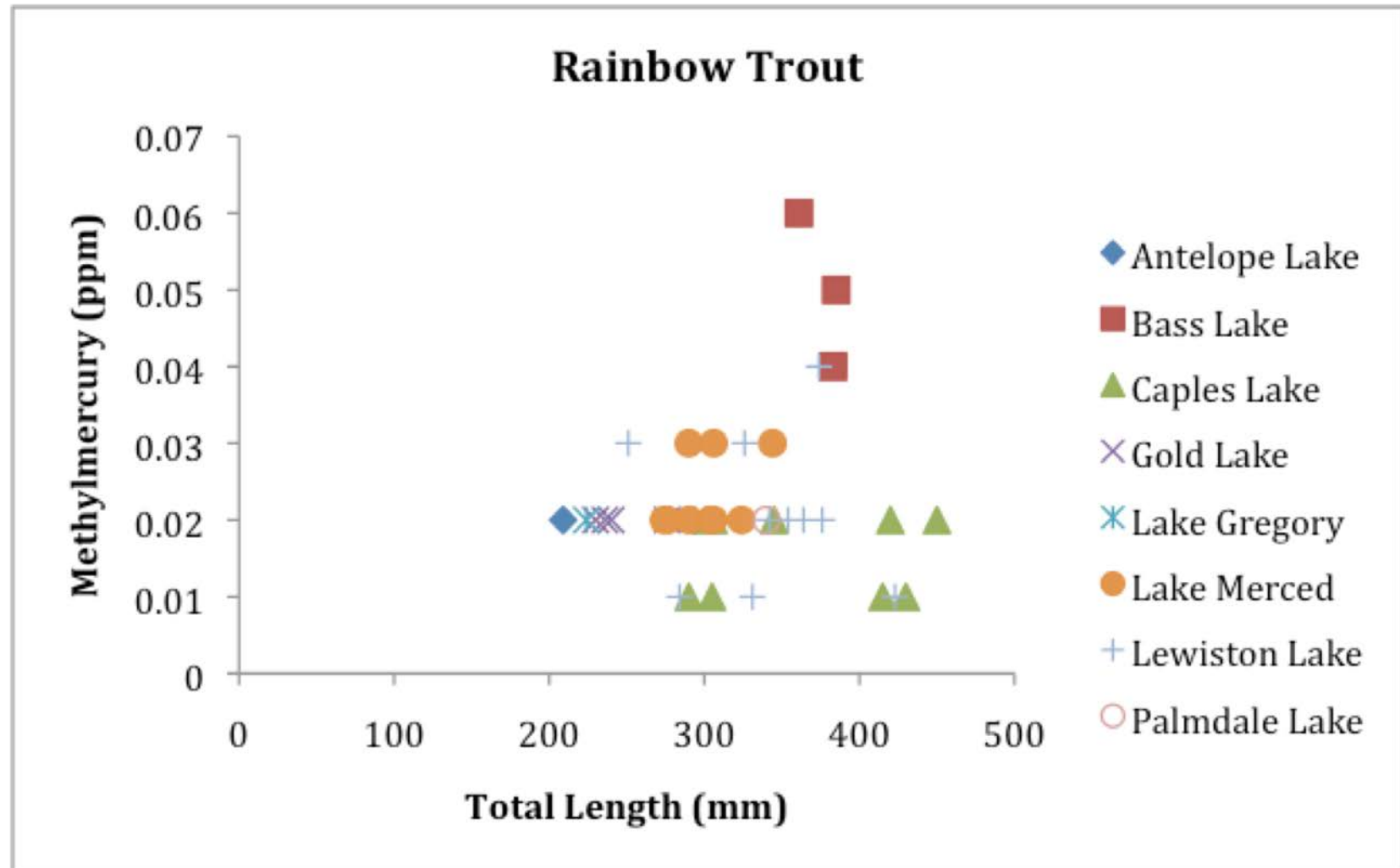


Region 7

Bass Species

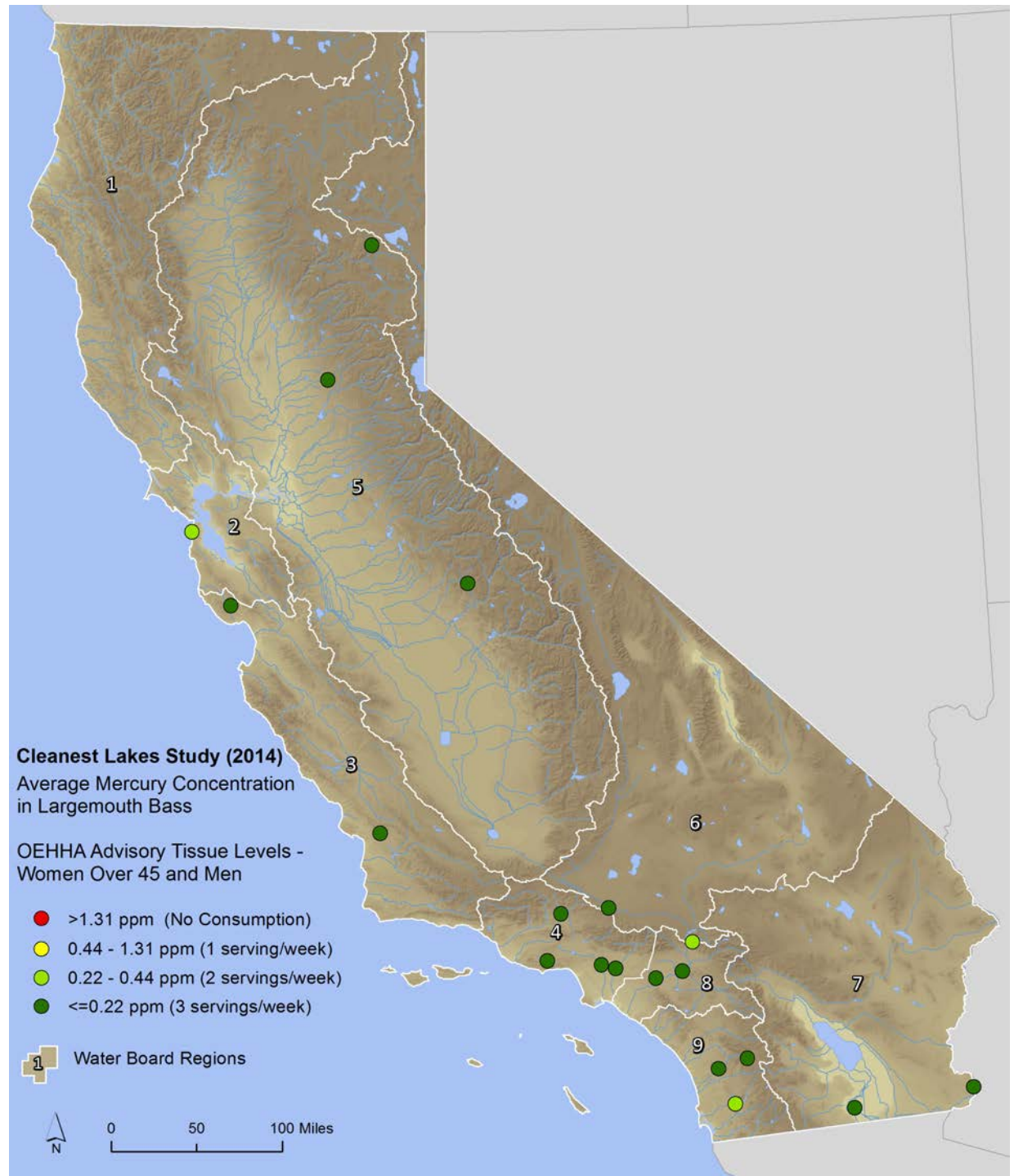


Cleanest Lakes



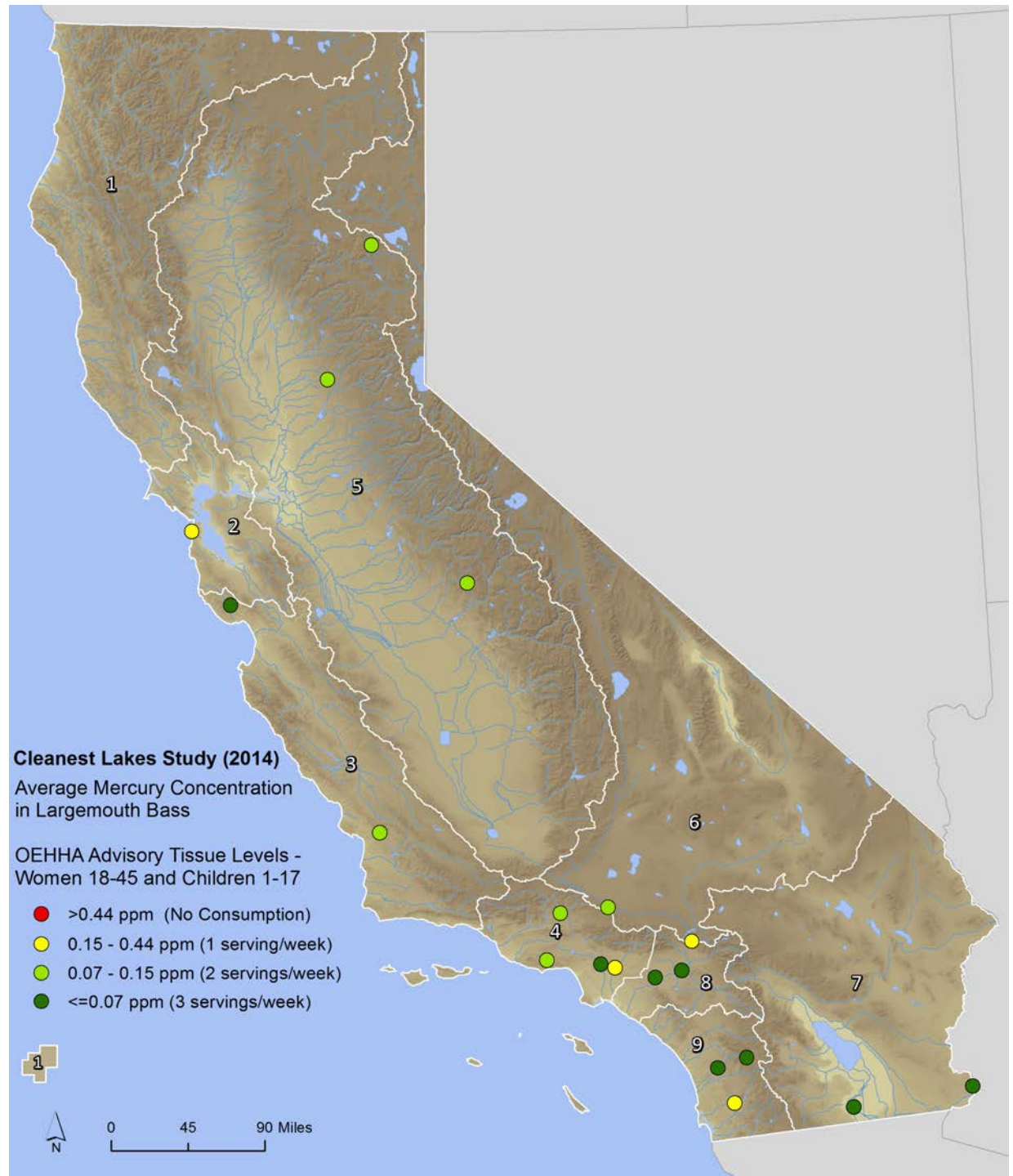
Cleanest Lakes

Women Over 45 and Men



Cleanest Lakes

Women 18-45 and
Children 1-17



Region 7

Women Over 45 and Men

Region 7 Study

Average Mercury Concentration
in Largemouth Bass

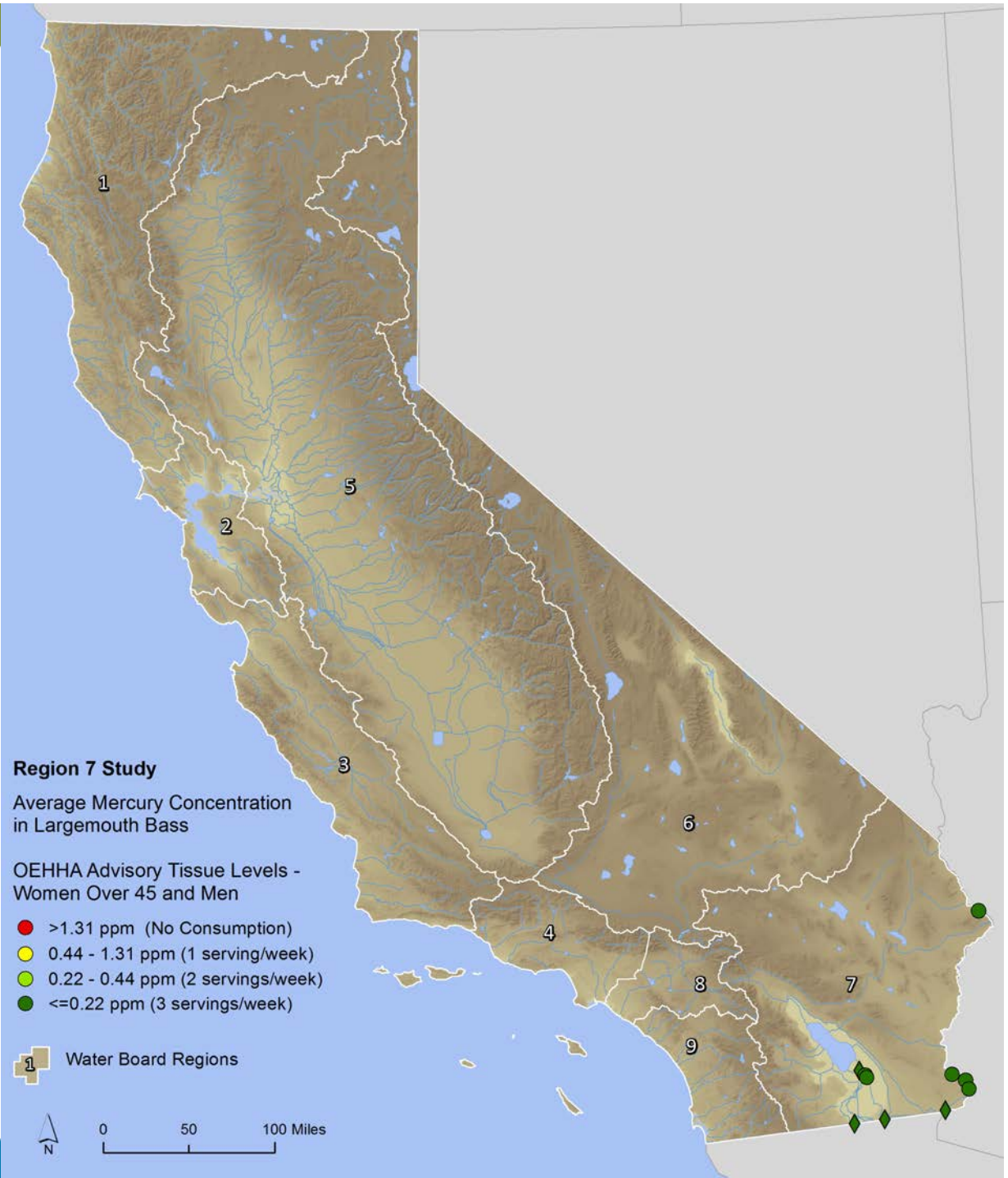
OEHHA Advisory Tissue Levels -
Women Over 45 and Men

- >1.31 ppm (No Consumption)
- 0.44 - 1.31 ppm (1 serving/week)
- 0.22 - 0.44 ppm (2 servings/week)
- ≤0.22 ppm (3 servings/week)

1 Water Board Regions



0 50 100 Miles



Region 7

Women 18-45 and
Children 1-17

Region 7 Study

Average Mercury Concentration
in Largemouth Bass

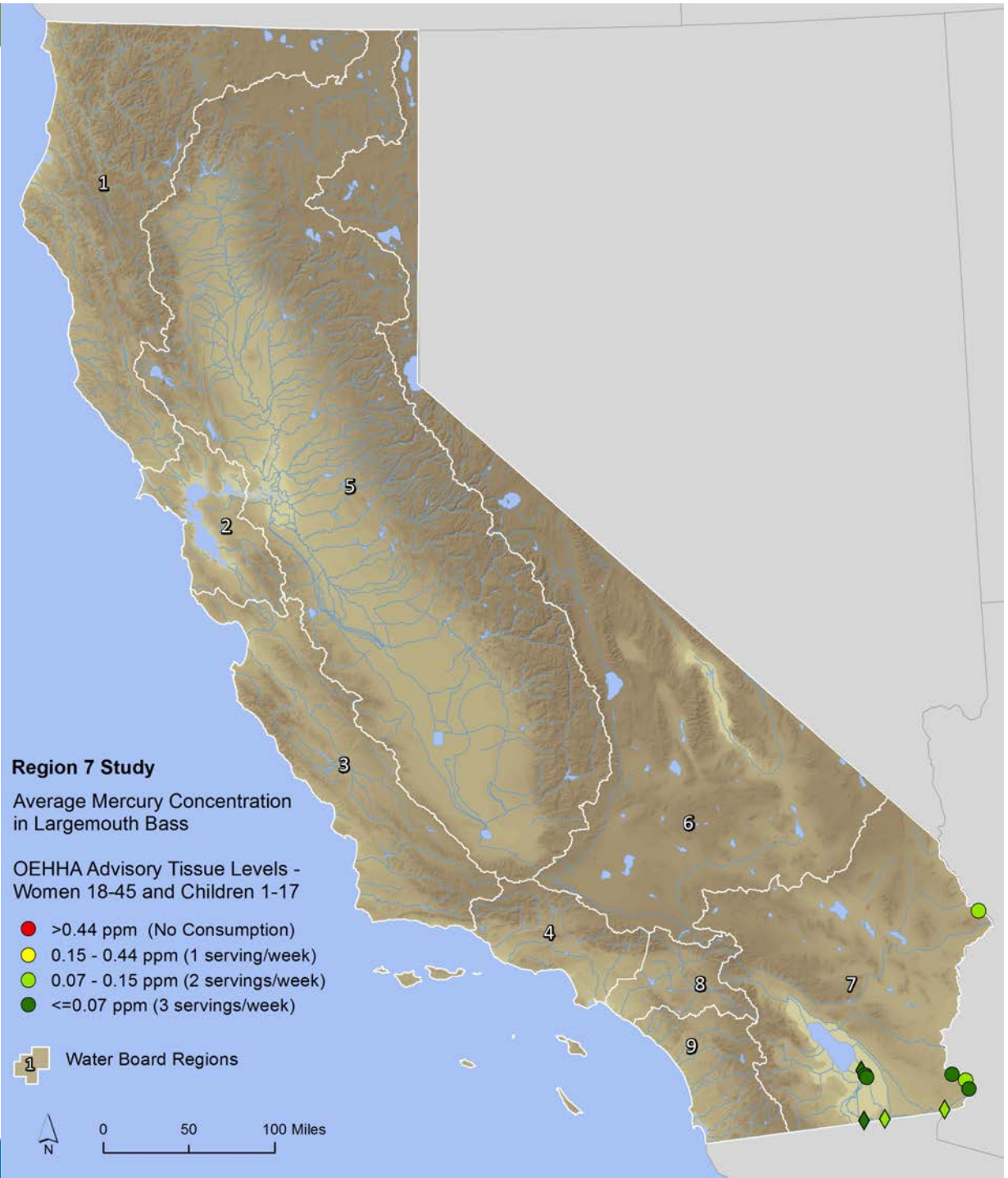
OEHHA Advisory Tissue Levels -
Women 18-45 and Children 1-17

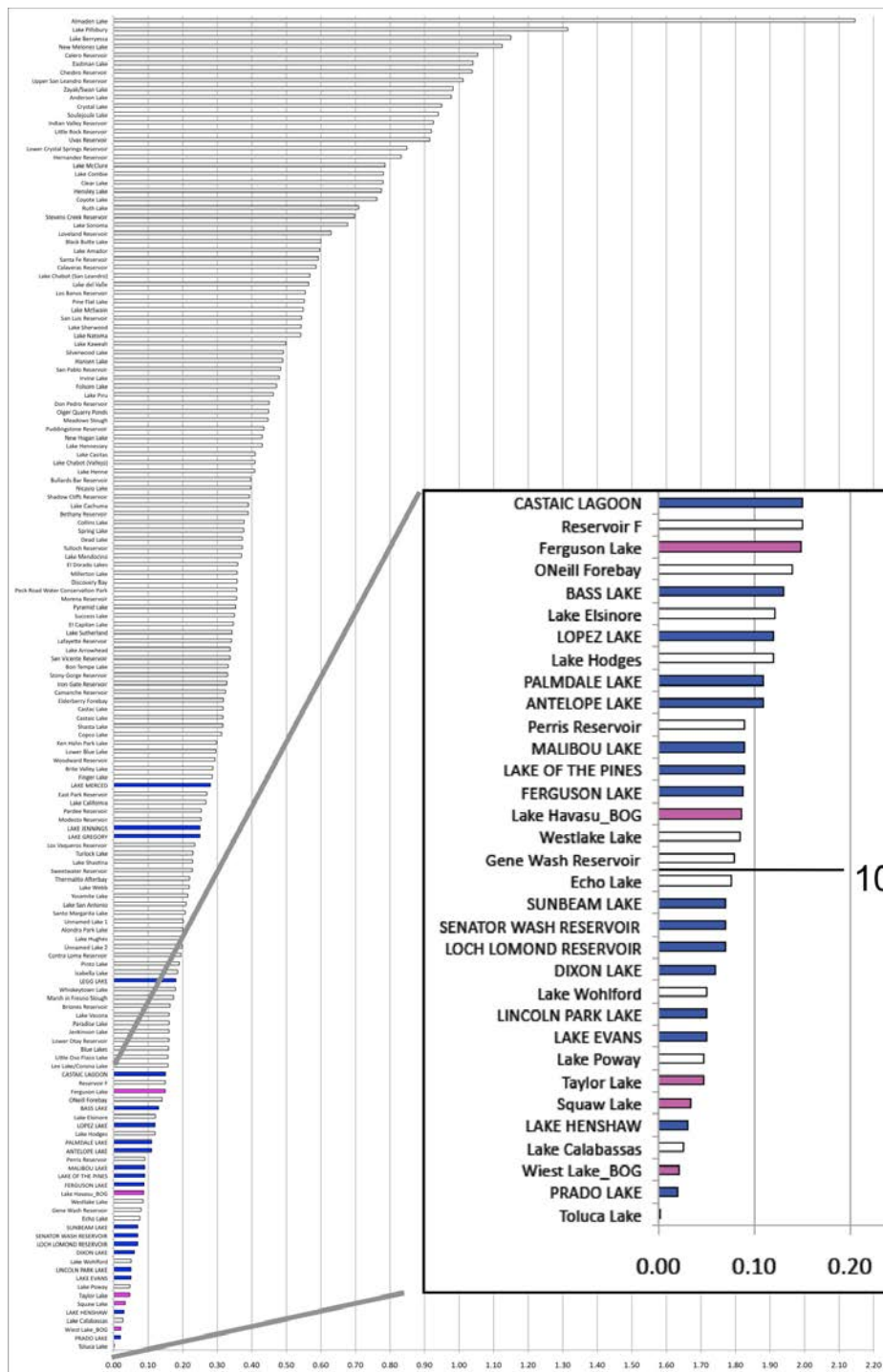
- >0.44 ppm (No Consumption)
- 0.15 - 0.44 ppm (1 serving/week)
- 0.07 - 0.15 ppm (2 servings/week)
- ≤0.07 ppm (3 servings/week)

1 Water Board Regions



0 50 100 Miles

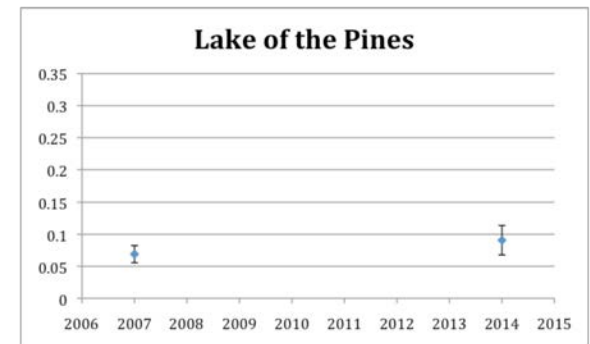
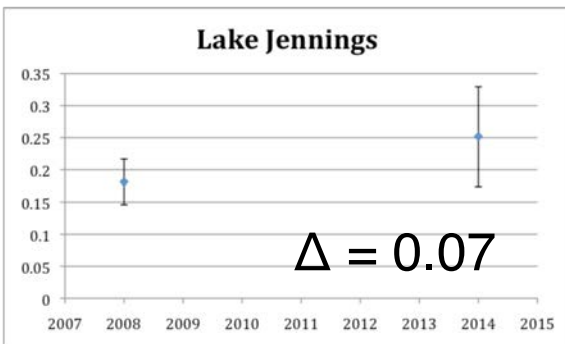
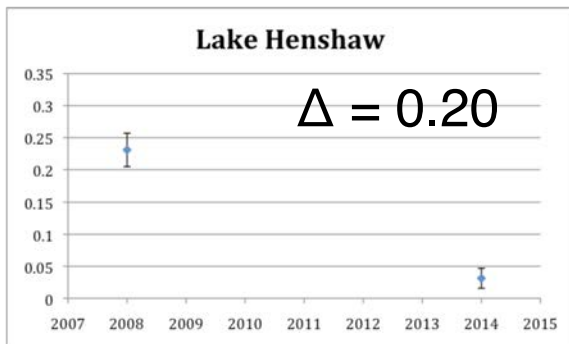
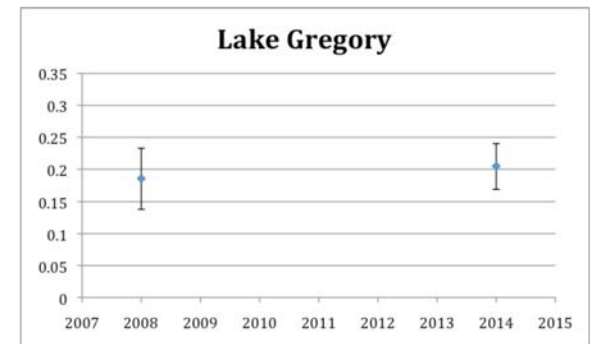
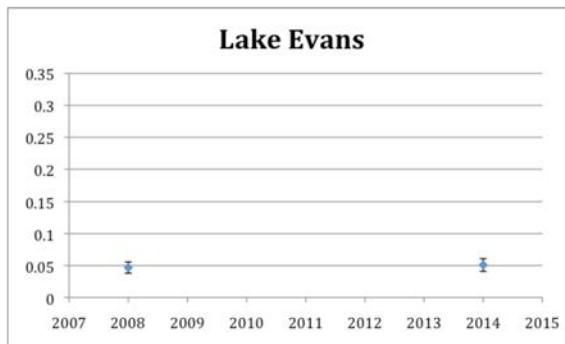
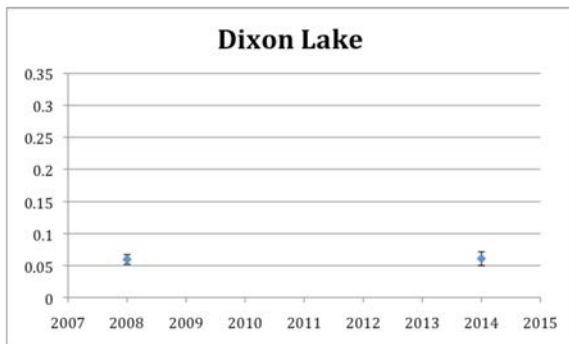
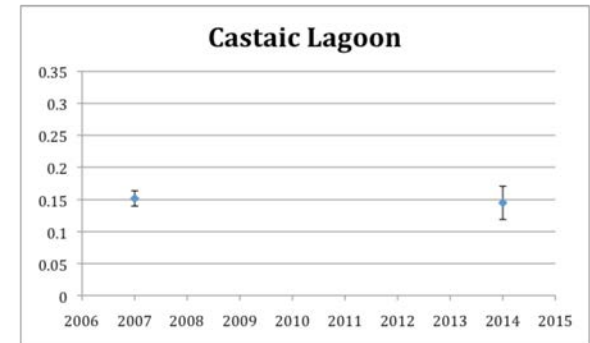
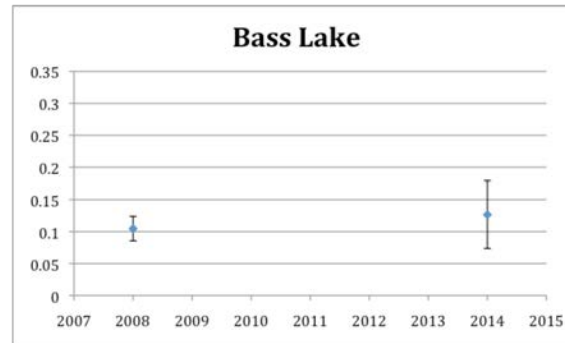
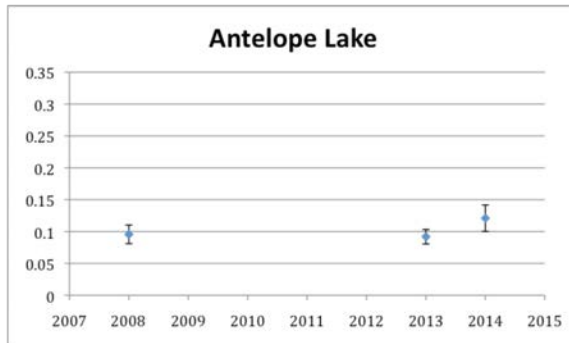




Lakes with Length-adjusted Largemouth Bass

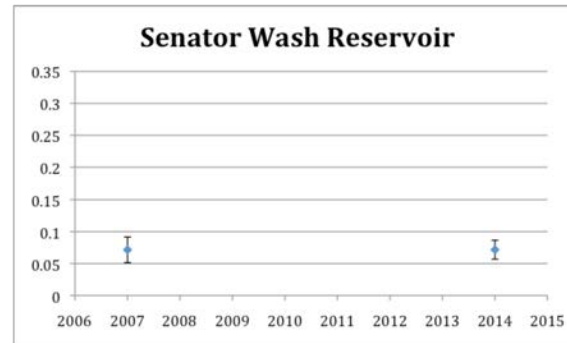
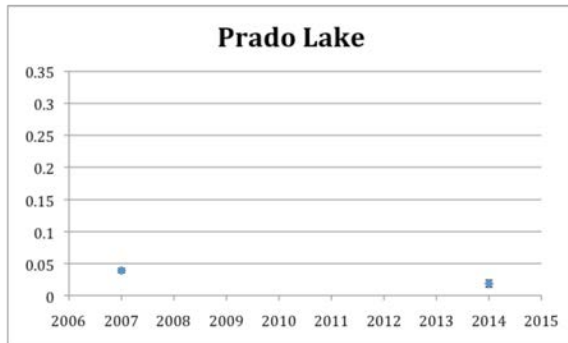
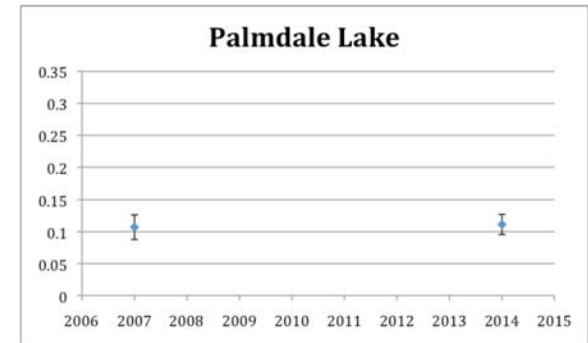
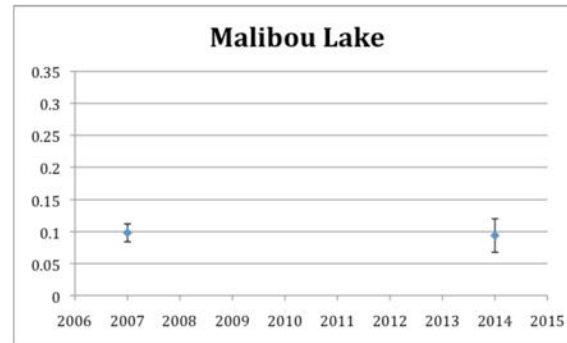
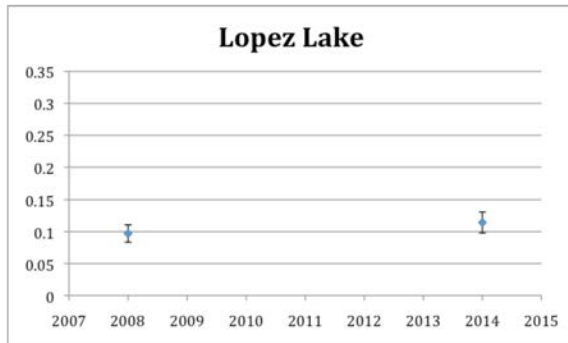
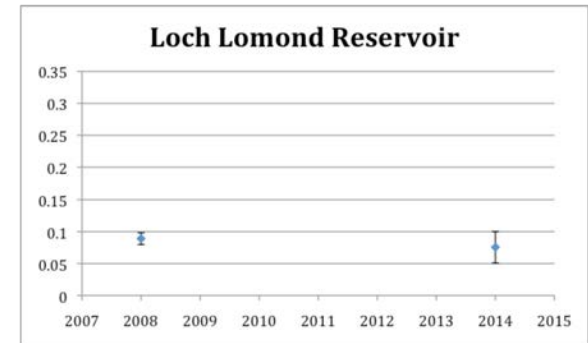
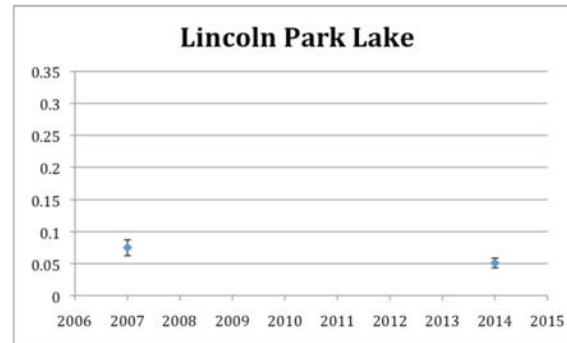
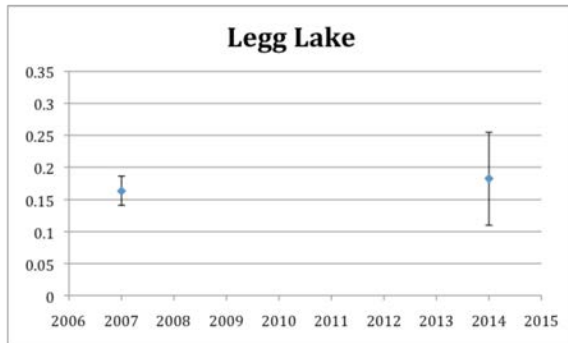
- 157 lakes sampled to date
- 11 of 16 lakes in lowest 10th percentile from Clean Lakes and Region 7 Studies (Clean Lakes in blue, Region 7 in pink)
- Distribution very similar to the distribution in USEPA's national lakes survey

Temporal Comparison

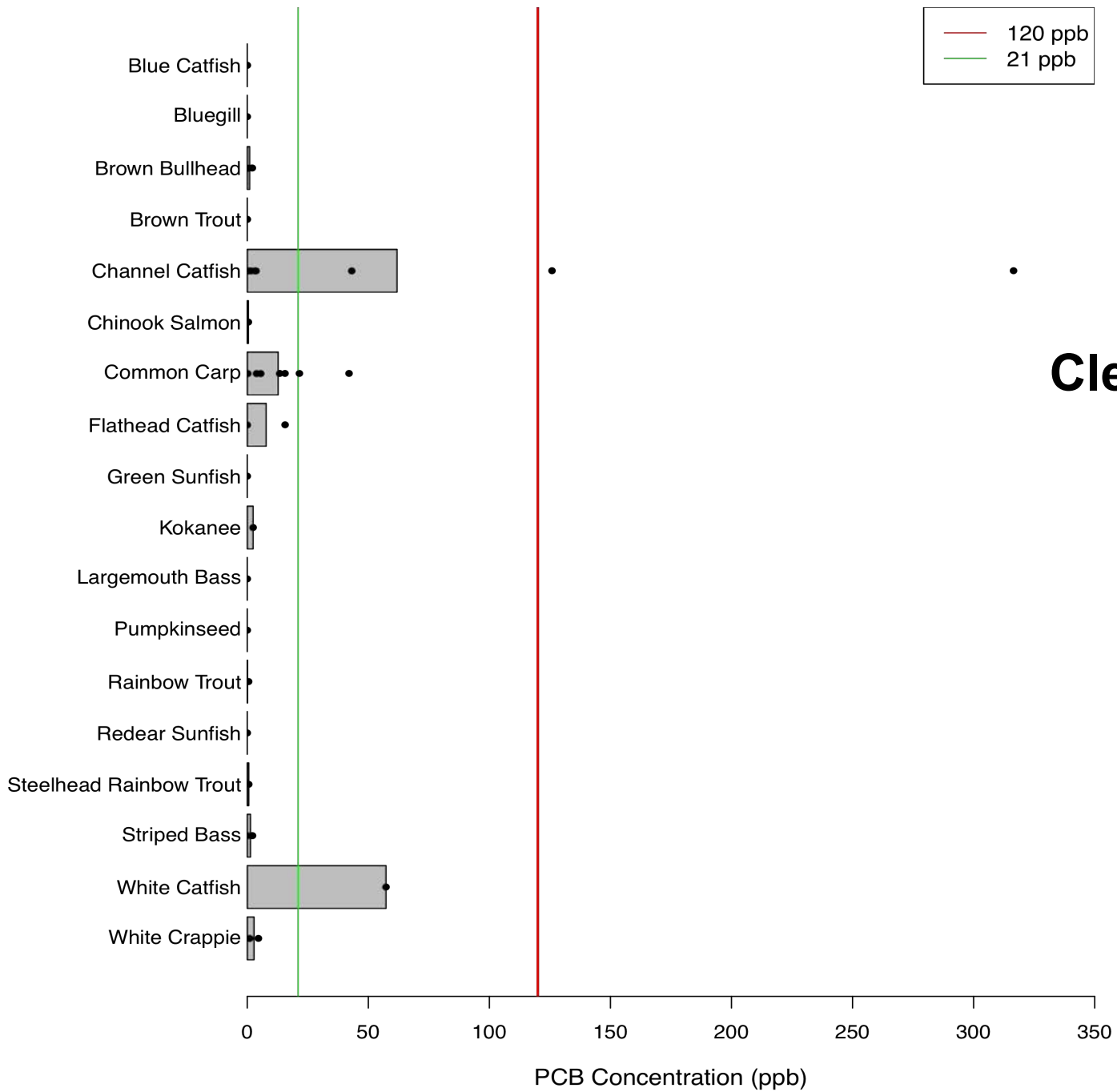


One high fish in 2014

Temporal Comparison

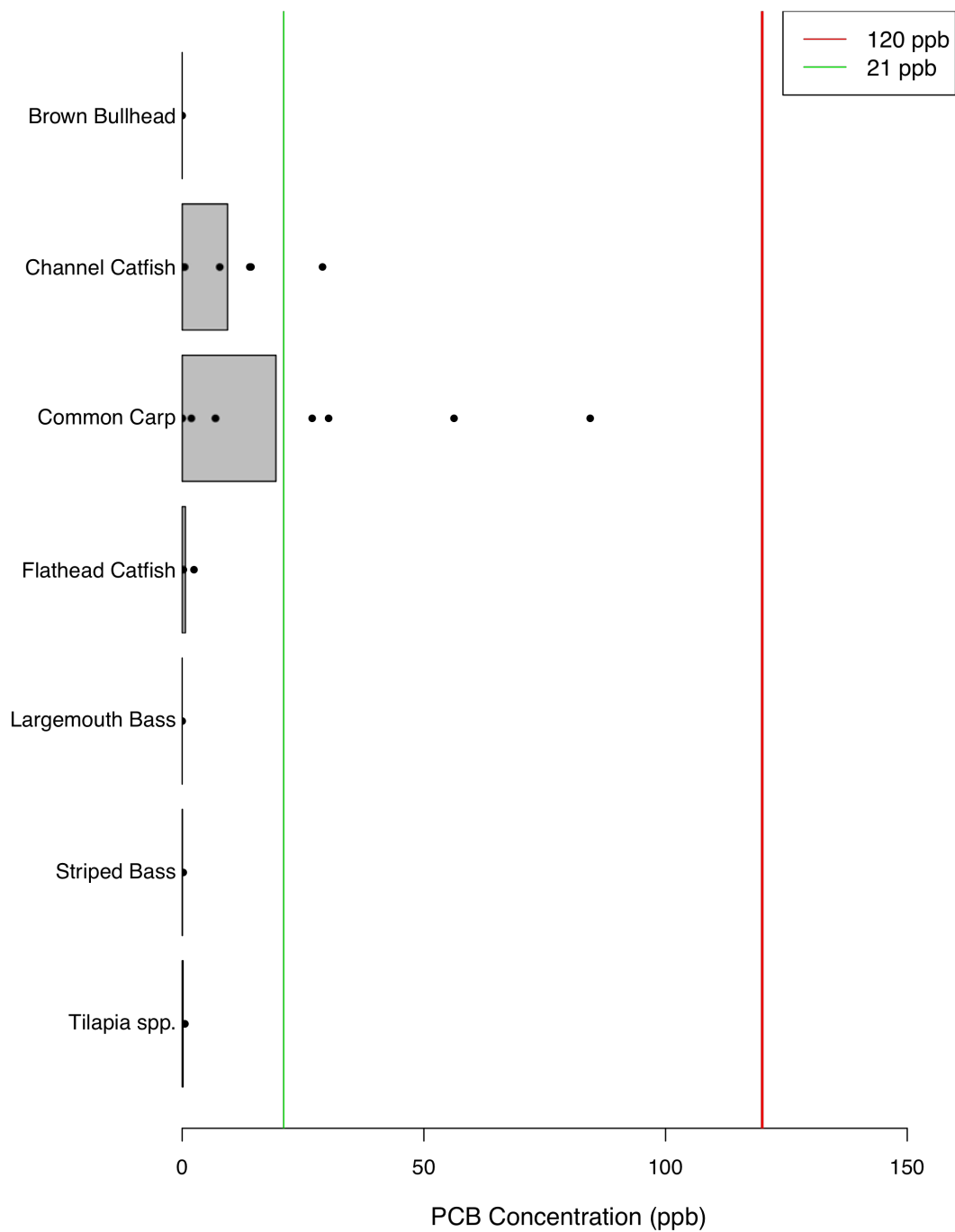


- $\Delta < 0.03$ ppm for all other lakes
- Median $\Delta = 0.02$ ppm



Cleanest Lakes

Region 7



Summary Table – Less-sensitive population

Region	Lake	Prior Data		Hg		PCBs		This Survey		PCBs		Summary	Potential for Followup**
		Year		P	S	P	S	P	S	P	S		
1	Lewiston Lake	2008										*	
2	Lake Merced		No data										
3	Loch Lomond	2008										*	
3	Lopez Lake	2008										1	
4	Castaic Lagoon	2007										*	
4	Castaic Lake	2007, 2010										*	
4	Legg Lake	2007, 2010										3*	X
4	Lincoln Park Lake	2007, 2010											
4	Malibou Lake	2007, 2010											X
5	Antelope Lake	2008										1	
5	Bass Lake	2008										1	
5	Caples Lake	2007										*	
5	Gold Lake	2007										*	
5	Lake of the Pines	2007										*	
6	Lake Gregory	2007											
6	Palmdale Lake	2007											
7	Senator Wash Reservoir	2007										3*	X
7	Sunbeam Lake	2004										1	
8	Lake Evans	2008											
8	Prado Lake	2007										1	
9	Dixon Lake	2008										2*	X
9	Lake Henshaw	2008										1	
9	Lake Jennings	2008											
7	Ferguson Lake	2007										1	
7	Finney Lake											2	X
7	Lake Havasu_BOG	2007										2	X
7	Squaw Lake											2	X
7	Taylor Lake											2	X
7	Wiest Lake_BOG	2004, 2007										2	X
7	Alamo River Above Drop 3											2	
7	Alamo River at International Boundary												
7	Alamo River Outlet	2004, 2012											
7	All American Canal at Mesa 2												
7	All American Canal, Borderline												
7	American Canal at Bridge South of Quechan Casino												
7	New River at Fig Drain	2012										*	
7	New River near Calexico Water Treatment Plant												
7	New River Outlet	2004, 2012											
*** based on 350 mm bass where available													* missing data for primary indicator species
** One round away from meeting "clean" criteria													
Color Key													
				Hg		PCB							1 all criteria met
				Red	>1.31	>120							2 both primary low in 2014, missing primary previously
				Orange	0.44-1.31	42-120							3 missing a primary in 2014, but it was low previously
				Yellow	0.22-0.44	21-42							
				Green	<0.22	<21							

- 7 lakes meet all criteria
- 8 more could with one more round of sampling
- 8 of the 15 from Region 7

Summary Table – Sensitive population

			Prior Data				This Survey				
Region	Lake	Year	Hg P	S	PCBs P	S	Hg P	S	PCBs P	S	Summary
1	Lewiston Lake	2008									*
2	Lake Merced		No data								
3	Loch Lomond	2008									*
3	Lopez Lake	2008									
4	Castaic Lagoon	2007									
4	Castaic Lake	2007, 2010									*
4	Legg Lake	2007, 2010									*
4	Lincoln Park Lake	2007, 2010									
4	Malibou Lake	2007, 2010									
5	Antelope Lake	2008									
5	Bass Lake	2008									
5	Caples Lake	2007									*
5	Gold Lake	2007									*
5	Lake of the Pines	2007									*
6	Lake Gregory	2007									
6	Palmdale Lake	2007									
7	Senator Wash Reservoir	2007									*
7	Sunbeam Lake	2004									
8	Lake Evans	2008									
8	Prado Lake	2007									1
9	Dixon Lake	2008									2
9	Lake Henshaw	2008									
9	Lake Jennings	2008									
7	Ferguson Lake	2007									
7	Finney Lake										2
7	Lake Havasu_BOG	2007									
7	Squaw Lake										
7	Taylor Lake										2
7	Wiest Lake_BOG	2004, 2007									2
7	Alamo River Above Drop 3										2
7	Alamo River at International Boundary										*
7	Alamo River Outlet	2004, 2012									*
7	All American Canal at Mesa 2										
7	All American Canal, Borderline										
7	American Canal at Bridge South of Quechan Casino										
7	New River at Fig Drain	2012									*
7	New River near Calexico Water Treatment Plant										
7	New River Outlet	2004, 2012									*

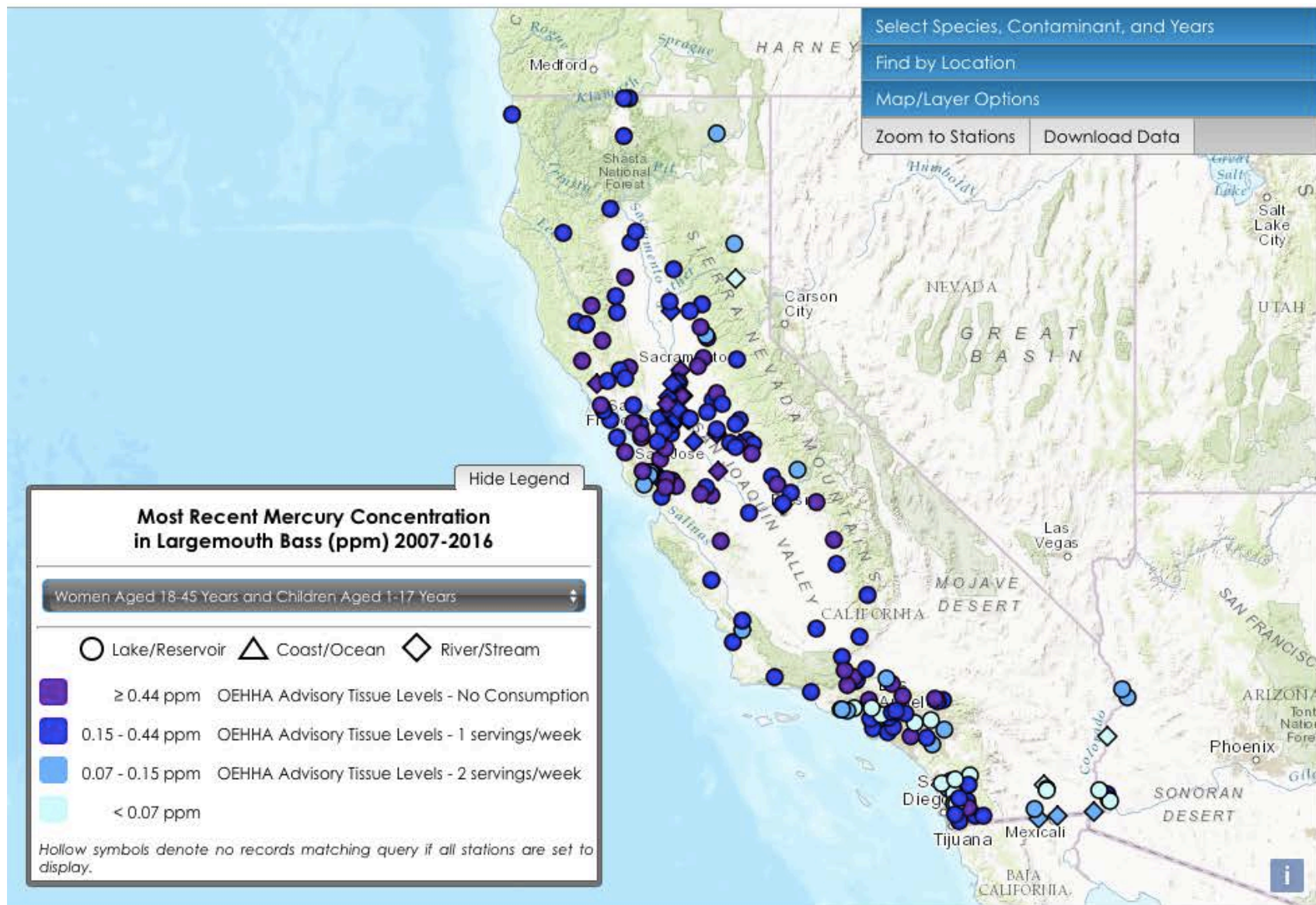
- Show draft Fact Sheet Figure

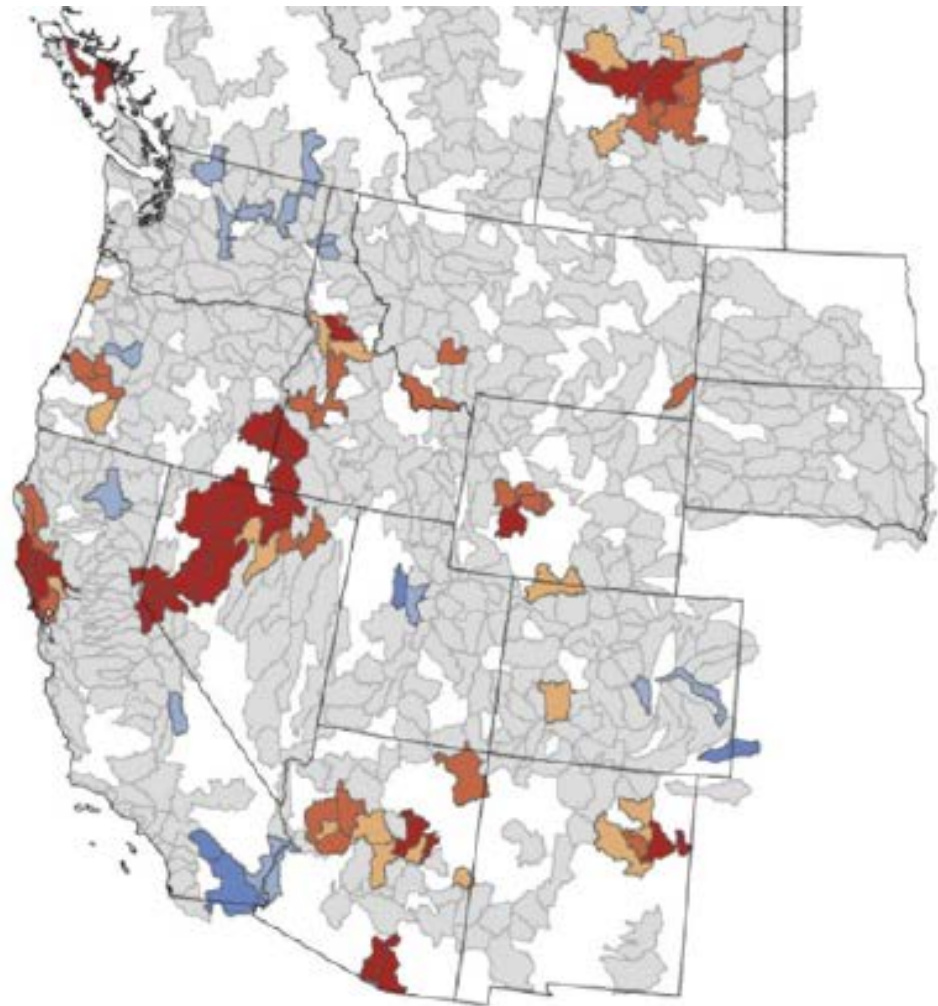
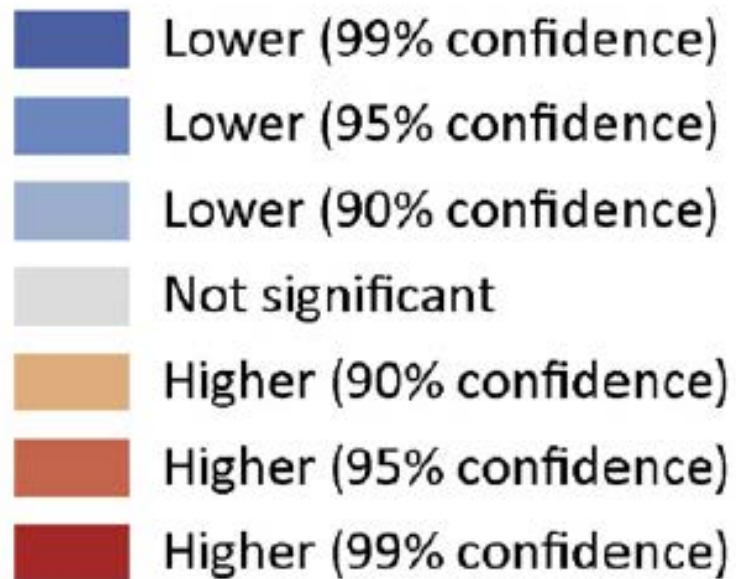


MQ1: Which popular lakes in California can be confirmed to have relatively low concentrations of contaminants in sport fish?

- Women over 45 and Men
 - 7 lakes meet all criteria
 - 8 more could meet all criteria with one more round of sampling
- Women 18-45 and Children 1-17
 - 1 lake met all criteria
 - 5 more could with one more round of sampling
- Mercury
 - Many lakes confirmed to be at the clean end of the distribution







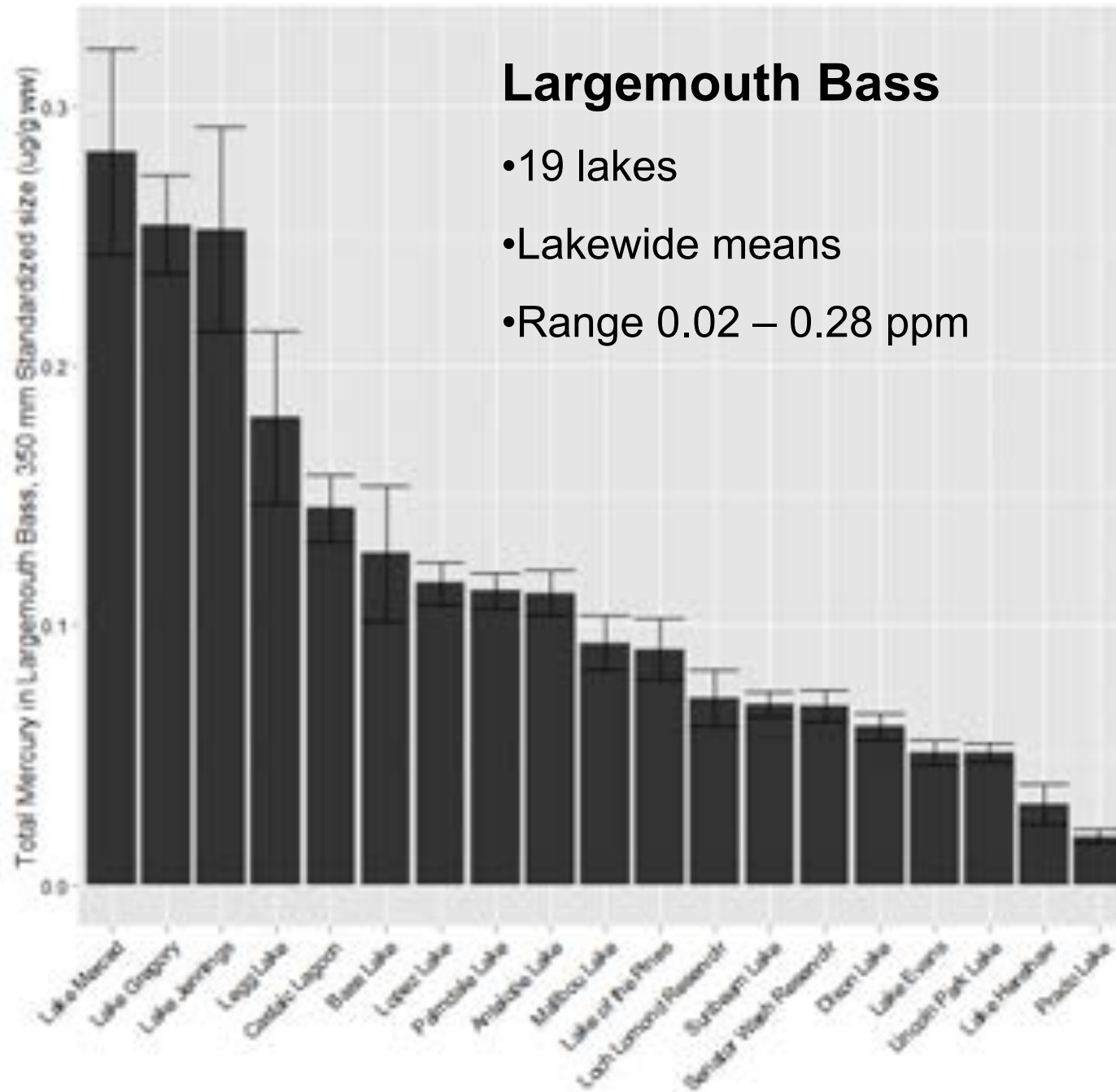
From Eagles-Smith et al. (2016). Analysis of fish total mercury concentration “hotspots” and “coldspots” at the watershed scale across western North America. Watersheds shaded red and blue represent least squares mean fish THg concentrations that are higher or lower, respectively, than expected by chance alone based upon adjacent watersheds. Different shades of red and blue represent different levels of statistical confidence.

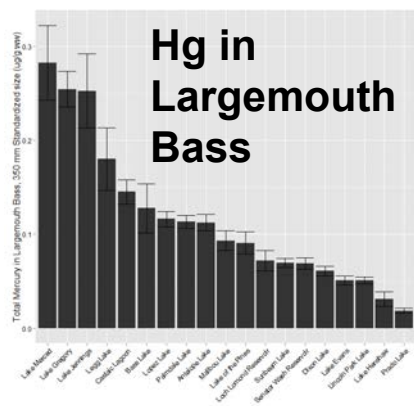
Sampling Design – 23 Lakes

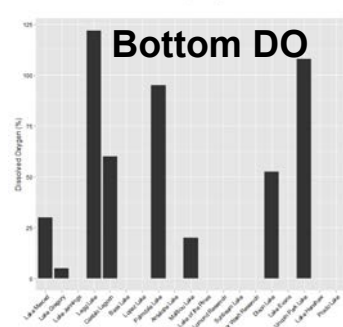
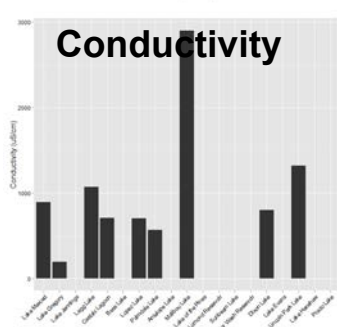
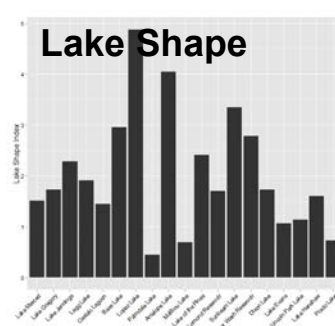
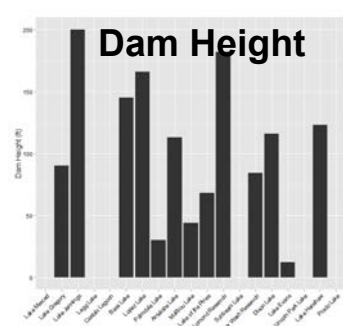
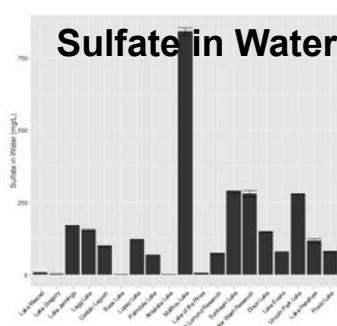
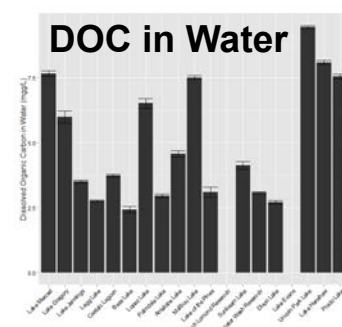
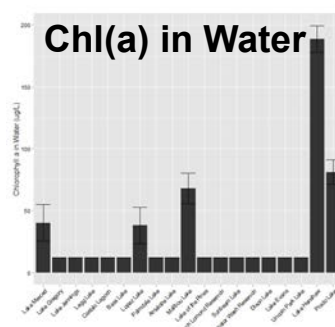
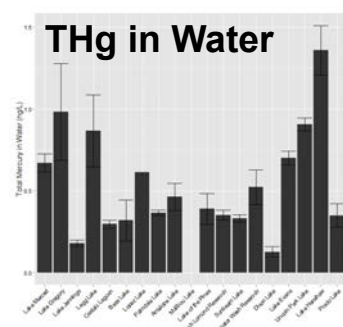
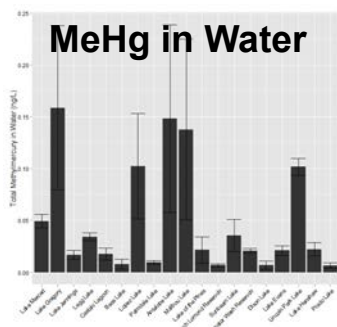
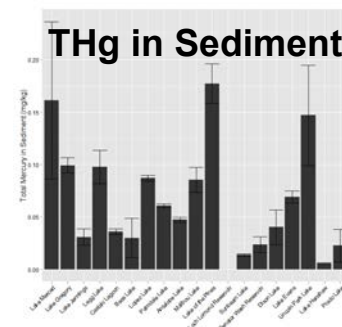
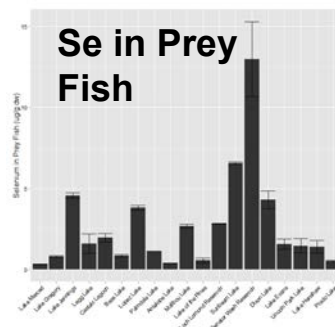
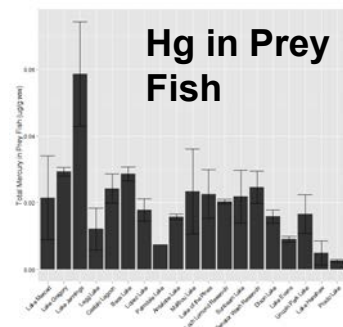
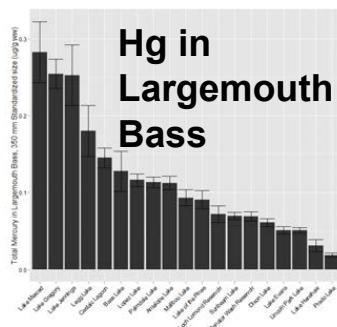
Sample Type	Number of Samples per Lake	Parameters
Largemouth Bass	10 individuals (size standardized to 350 mm)	Hg
Prey Fish	2-4 composites of ~10 individuals each	Hg, Se
Water Samples	2 samples (subsurface & near-bottom) at 3 locations in each lake (“Bank” or “Open Water”)	THg, MeHg, DOC, SO ₄ , Chla
Sediment Samples	1 sample at 3 locations, corresponding with Water Samples	THg
Lake Properties	NA	Dam Height, Surface Area, Perimeter, Elevation, Lake Shape Index

Largemouth Bass

- 19 lakes
- Lakewide means
- Range 0.02 – 0.28 ppm



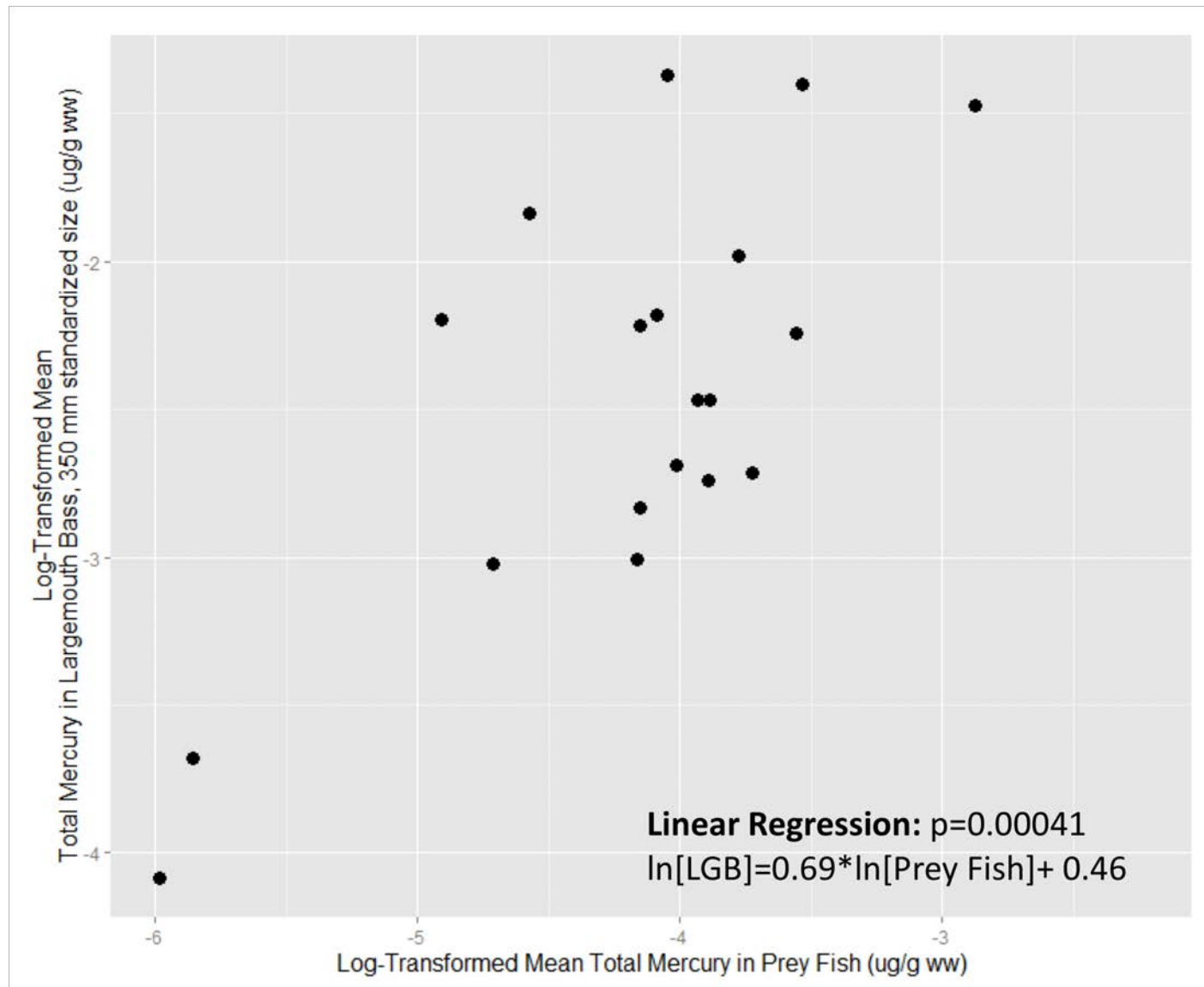


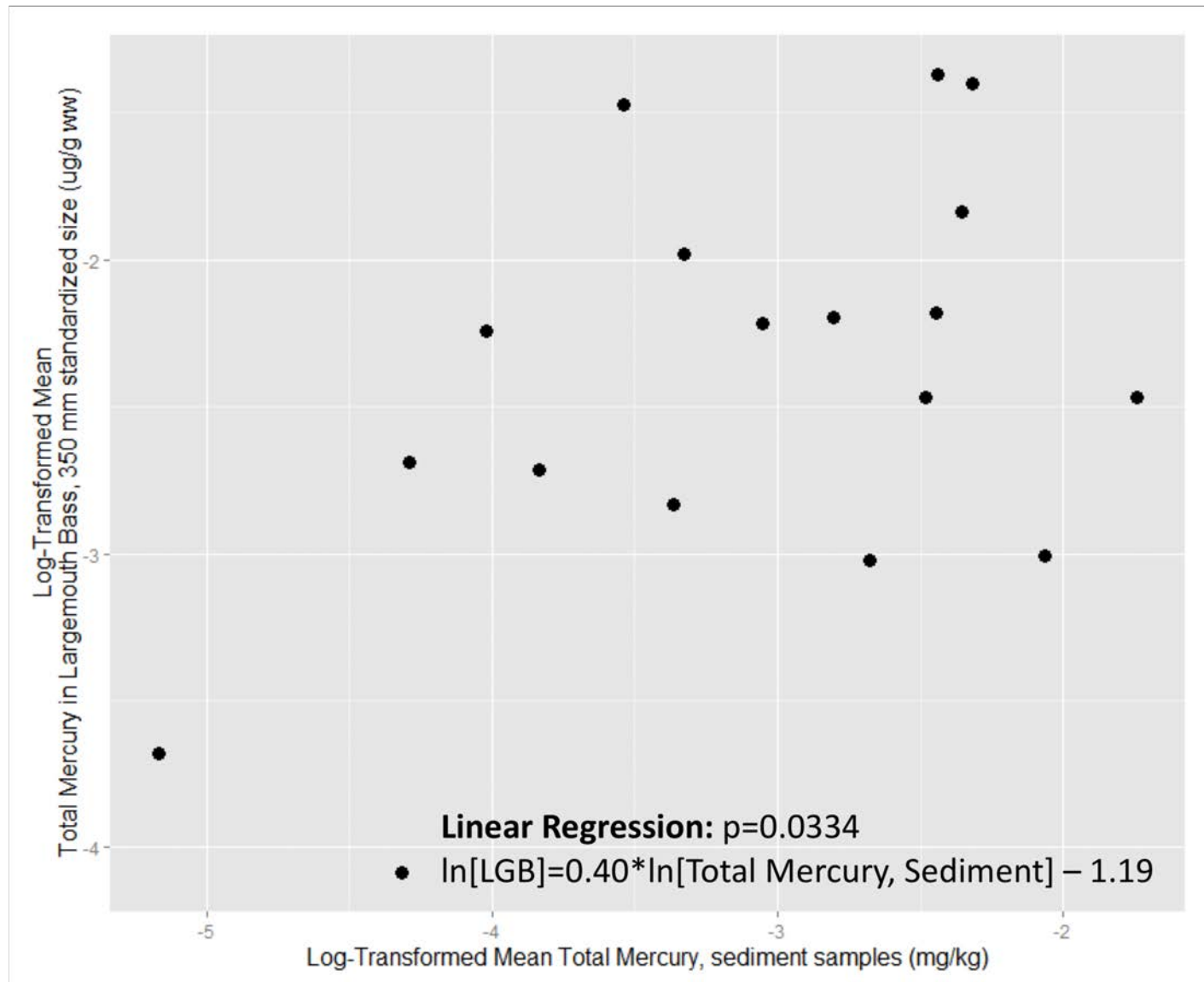


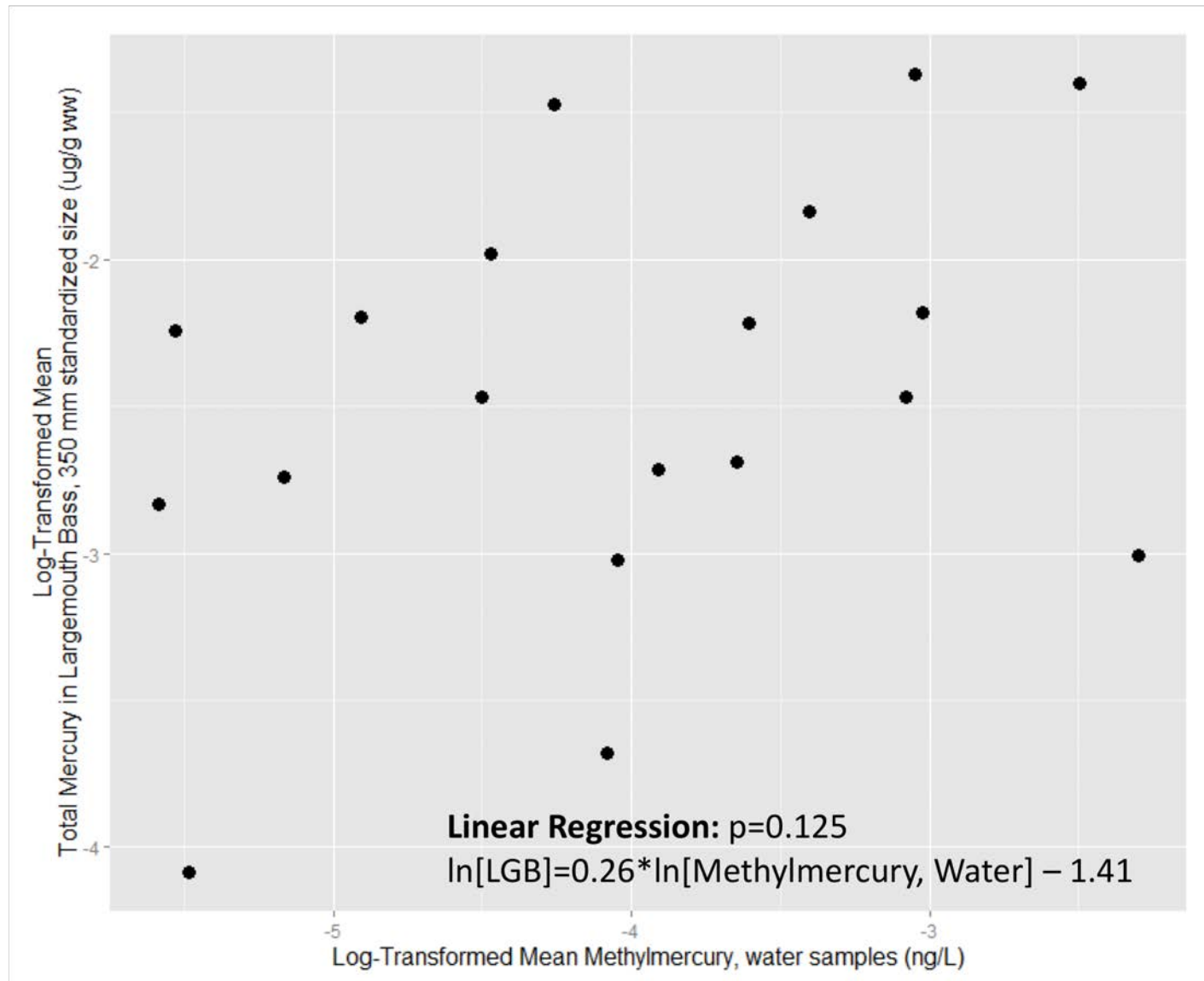
pH

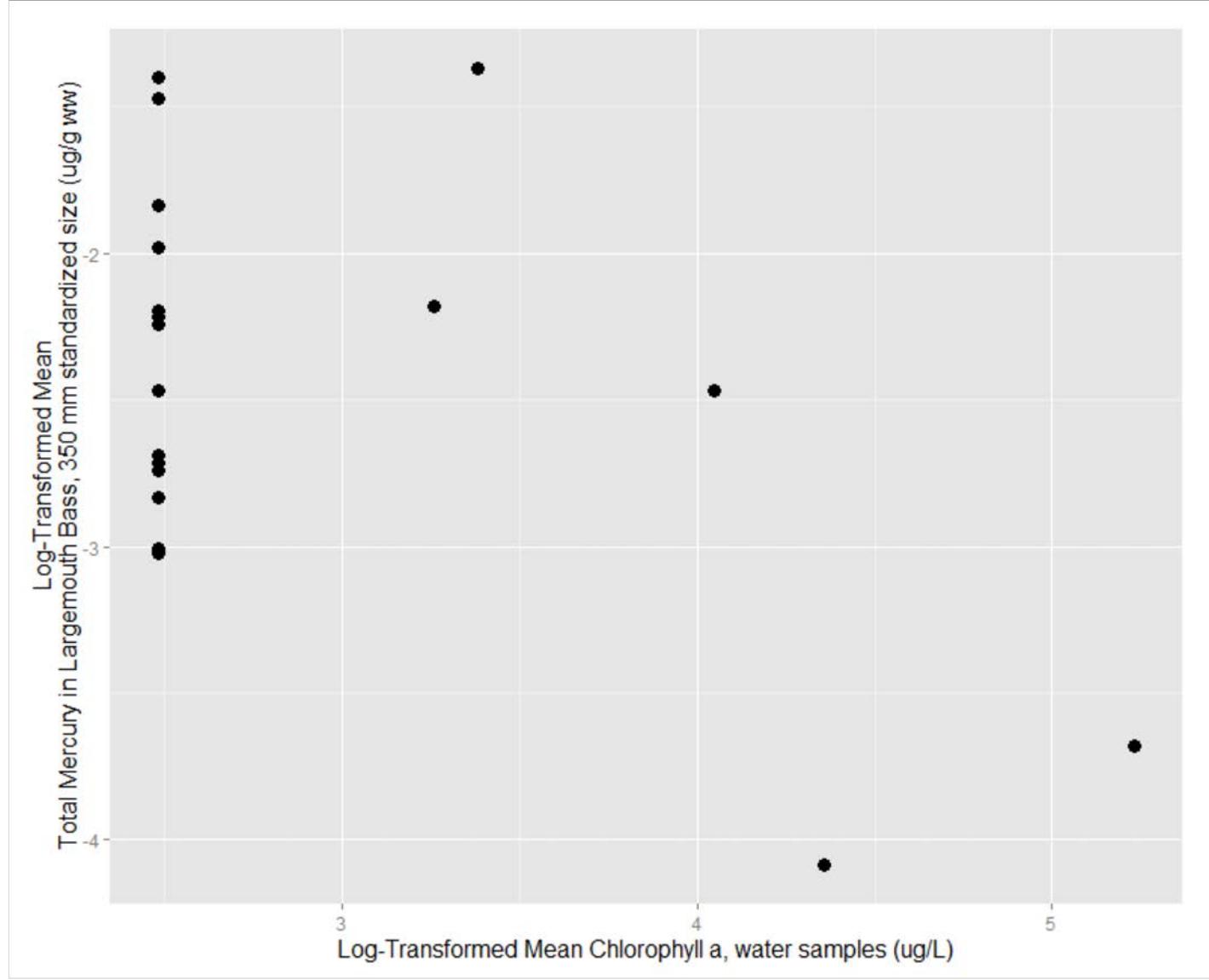
Spearman Correlation Matrix (nonparametric)

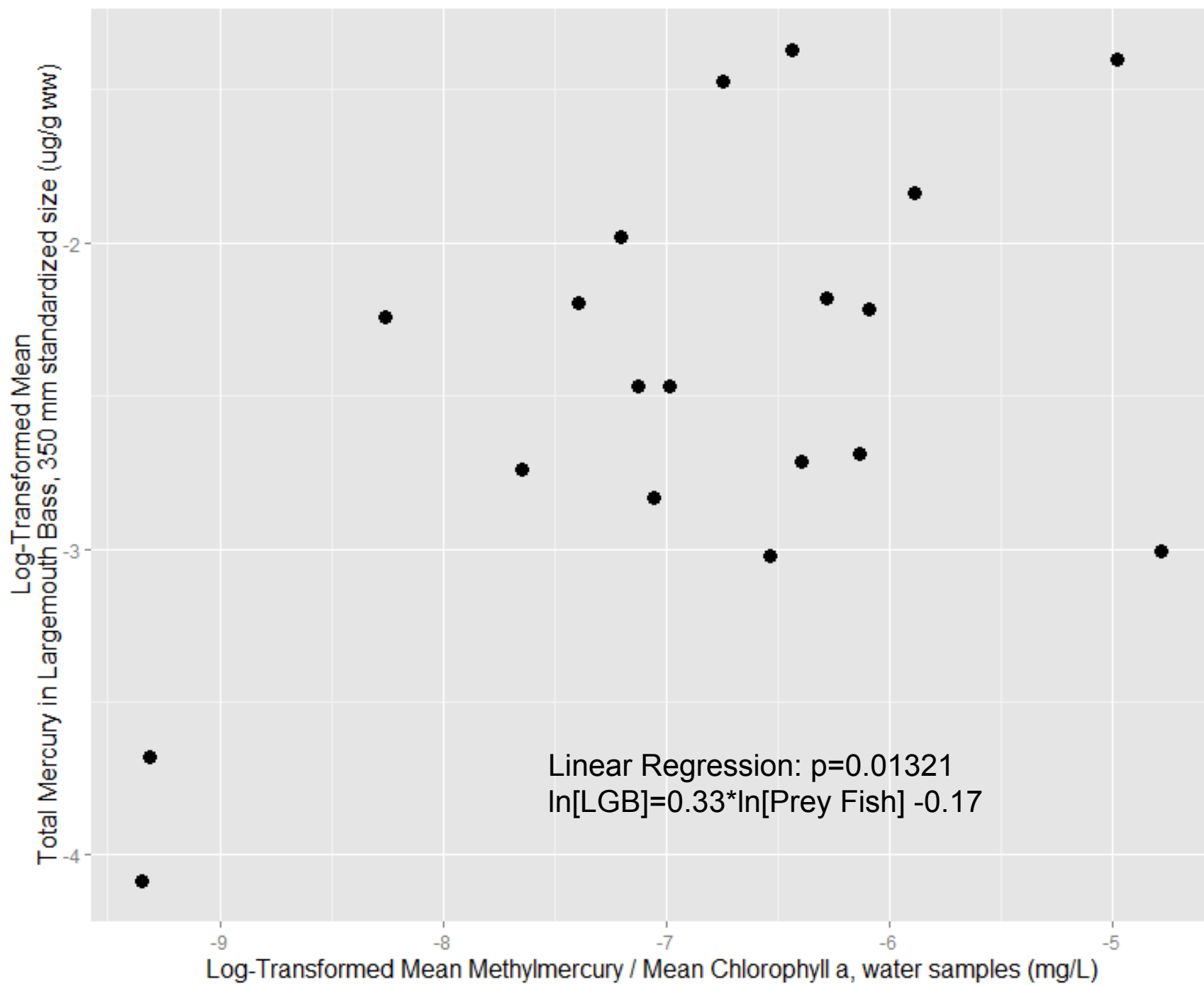
	Chl a	DOC	Largemouth Bass Hg	Largemouth Bass Hg (350 mm std)	MeHg in water	MeHg in water, near-bottom	MeHg in water, subsurface	MeHg / Chl a	Prey Fish Hg	Prey Fish Se	Sulfate	THg in sediment	THg in water	THg in water, near-bottom	THg in water, subsurface	Lake Dam Height	Lake Surface Area	Lake Perimeter	Lake Elevation
Chlorophyll a																			
DOC	0.65																		
Largemouth Bass Hg	-0.23																		
Largemouth Bass Hg (350 mm std)	-0.20	-0.22	0.93	0.00															
MeHg in water	0.22	0.62	0.16	0.29															
MeHg in water, near-bottom	0.23	0.56	0.14	0.30	0.93														
MeHg in water, subsurface	0.22	0.61	0.28	0.25	0.77	0.60													
MeHg / Chlorophyll a	-0.10	0.39	0.25	0.36	0.90	0.83	0.73												
Prey Fish Hg	-0.38	-0.52	0.63	0.55	-0.03	0.02	-0.04	0.12	0.00										
Prey Fish Se	-0.18	-0.11	-0.06	-0.14	-0.09	-0.06	0.13	-0.03	0.12										
Sulfate	0.24	0.42	-0.25	-0.30	0.23	0.18	0.56	0.19	-0.23	0.76									
THg in sediment	-0.13	-0.04	0.48	0.39	0.35	0.24	0.47	0.49	0.15	-0.36	-0.25								
THg in water	0.28	0.35	-0.09	-0.06	0.58	0.60	0.44	0.39	-0.19	-0.24	0.01	0.40							
THg in water, near-bottom	0.17	0.25	0.00	0.03	0.60	0.71	0.31	0.39	-0.11	-0.17	-0.06	0.29	0.94						
THg in water, subsurface	0.44	0.46	-0.24	-0.21	0.51	0.46	0.50	0.31	-0.38	-0.28	0.09	0.41	0.91	0.75					
Lake Dam Height	-0.07	-0.19	0.15	0.10	-0.18	-0.18	-0.39	-0.25	0.23	0.26	-0.15	-0.29	-0.11	-0.06	-0.25				
Lake Surface Area	0.08	-0.34	0.11	0.19	-0.18	-0.10	-0.58	-0.32	0.28	-0.24	-0.58	-0.19	0.04	0.09	-0.06	0.55			
Lake Perimeter	0.03	-0.33	0.15	0.17	-0.18	-0.10	-0.55	-0.26	0.31	-0.04	-0.44	-0.19	-0.03	-0.02	-0.11	0.63	0.93		
Lake Elevation	-0.25	-0.44	-0.01	0.09	-0.18	-0.13	-0.51	-0.21	0.31	-0.46	-0.75	0.04	-0.06	0.05	-0.19	0.28	0.56	0.37	
Lake Shape Index	-0.30	-0.37	0.22	0.25	0.04	0.02	-0.24	0.11	0.34	0.20	-0.21	-0.09	-0.03	-0.04	-0.12	0.52	0.50	0.66	0.05

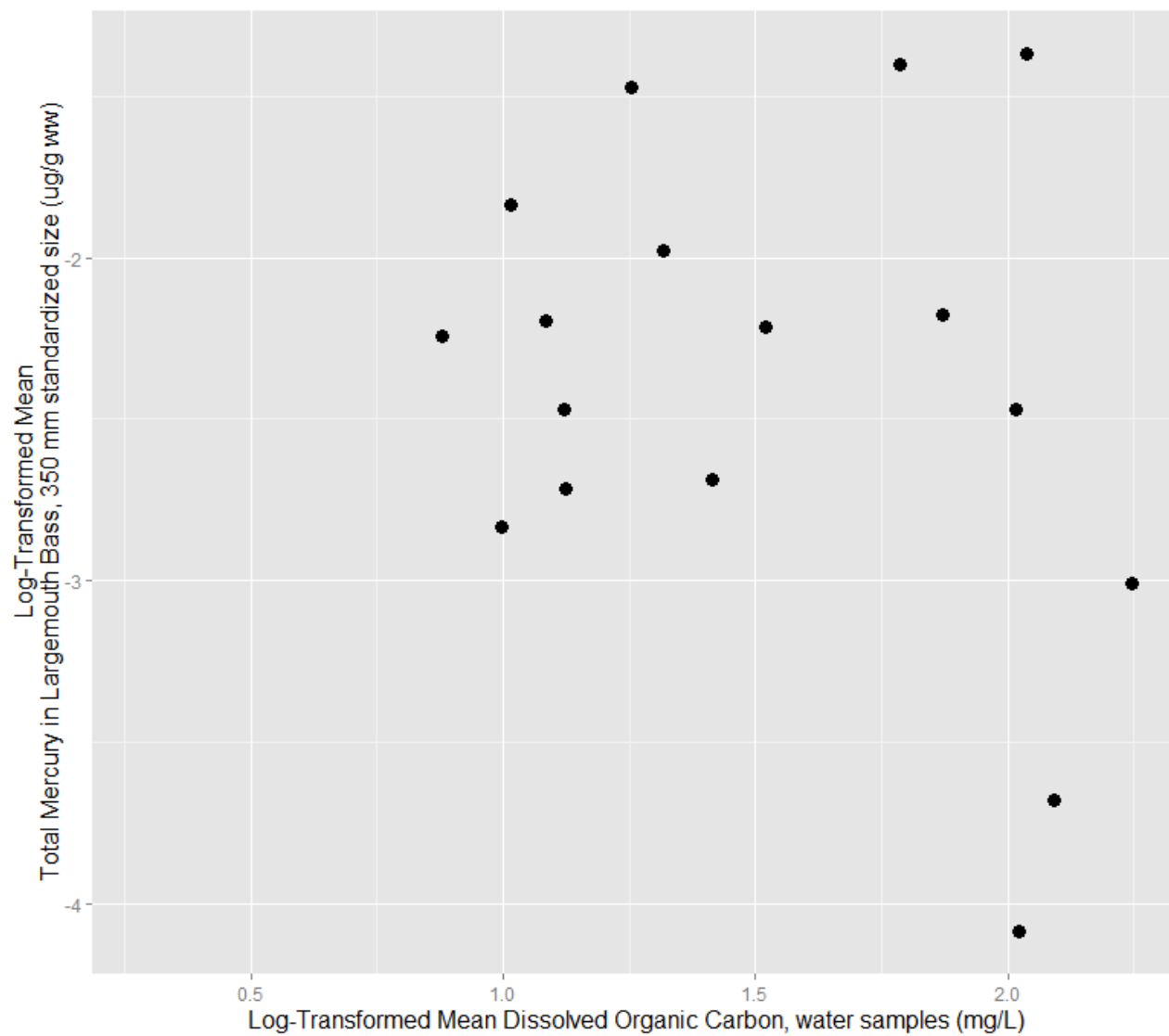


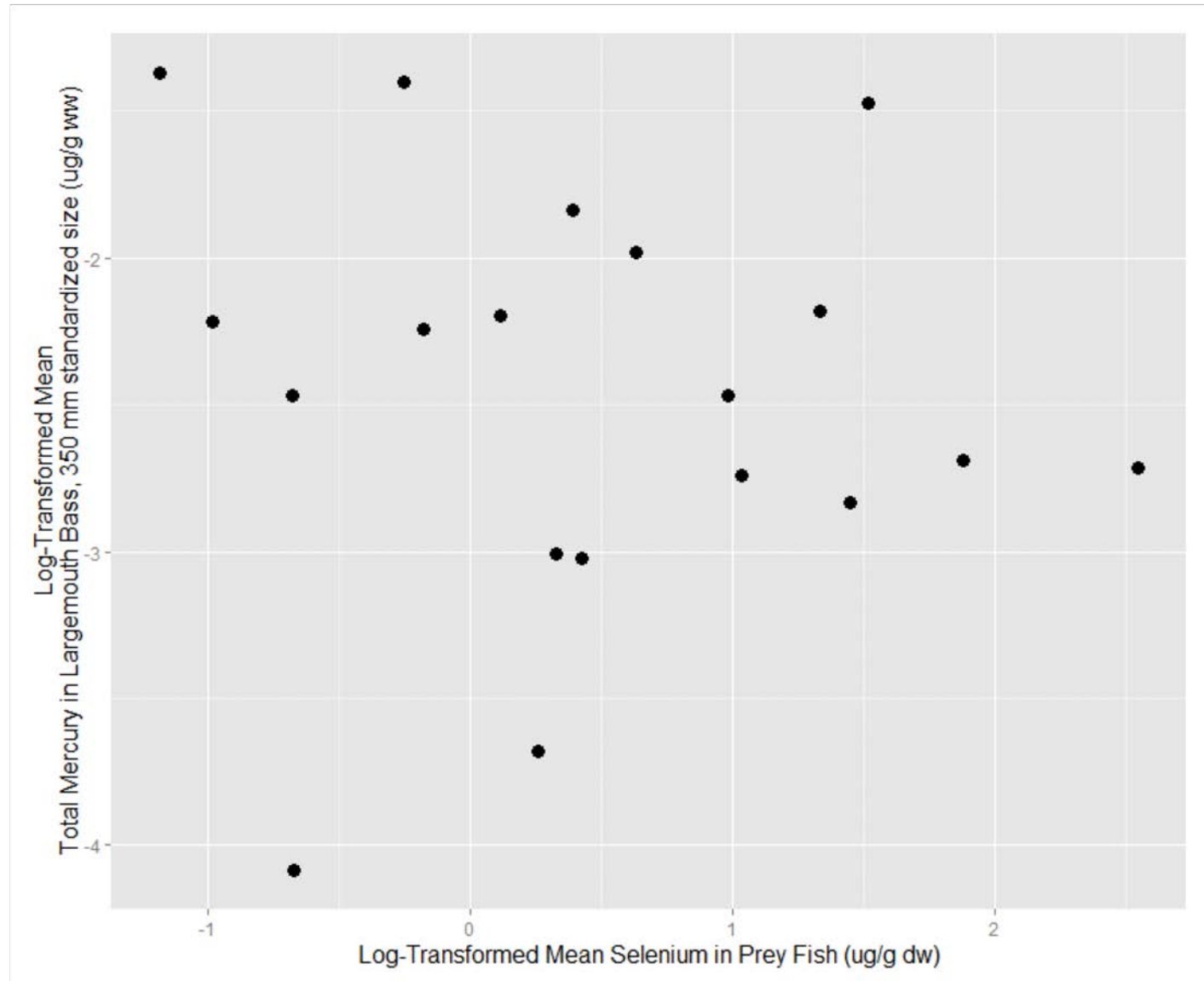


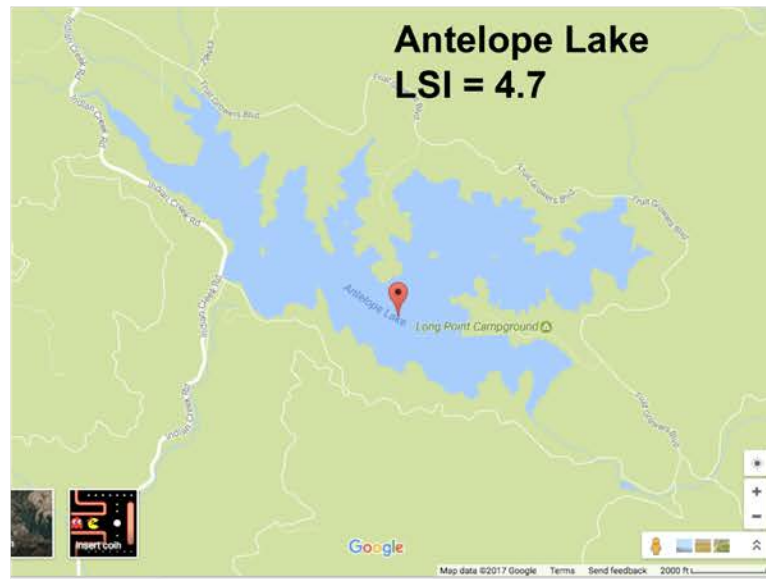












LSI for a circle = 0.89; for a square = 1.0

Mixed-Effects Models

- Dependent Variable: Largemouth Bass, 350 mm size standardized (log transformed)
- Random Variables
 1. Lake – account for spatial autocorrelation
 2. Prey Species / Lake (nested random effect)
- Fixed Variables: various additive combinations of:
 - Prey fish Hg
 - Water parameter (MeHg/Chla, SO₄)
 - Sediment parameter (Total Mercury)
 - Lake property parameter (Dam Height)
 - May continue to investigate others?

Evaluating Models

- Model selection: Akaike Information Criterion coefficient (AICc)
 - Used to compare between models run with the same random effect
 - Evaluates tradeoffs between model goodness of fit and complexity
 - Lower AICcs = better model (i.e., for interpretation of the table)
- Identifying significant parameters: p-value for each fixed variable
- Model runs and statistical criteria calculations done in R (nlme package)

Linear mixed-effects model candidate set

Fixed Effects	AICc	Factor p-values					
		Intercept	THg _{Prey Fish}	MeHg _{water}	THg _{sediment}	Lake Shape Index	SO4
Null	3008.67						
THg _{PreyFish} + Lake Shape Index	2993.05	0	0.0001			0.15	
THg _{PreyFish}	2993.18	0	0.0001				
THg _{PreyFish} + THg _{sediment} + Lake Shape Index	2994.89	0	0.0001		0.69	0.15	
THg _{PreyFish} + MeHg _{water} + Lake Shape Index	2995.04	0	0.0001	0.92		0.15	
THg _{PreyFish} + SO4 + THg _{sediment} + Lake Shape Index	2996.17	0	0.0001		0.68	0.19	0.39
THg _{PreyFish} + MeHg _{water} + THg _{sediment} + Lake Shape Index	2996.88	0	0.0001	0.92	0.69	0.15	
THg _{PreyFish} + MeHg _{water} + THg _{sediment}	2997.02	0	0.0001	0.01	0.71		
Lake Shape Index	3007.03	0				0.05	
THg _{sediment} + Lake Shape Index	3008.97	0			0.80	0.05	
MeHg _{water} + Lake Shape Index	3009.03	0		0.95		0.05	
SO4 + THg _{sediment} + Lake Shape Index	3010.83	0			0.80	0.05	0.71
MeHg _{water} + THg _{sediment} + Lake Shape Index	3010.96	0		0.95	0.80	0.05	

MQ2: Why do some lakes have relatively low concentrations of methylmercury in sport fish?

- Mystery remains unsolved
- Aqueous MeHg/Chl and THg in sediment may have potential
- Analysis handicapped by
 - Limited range in bass mercury
 - Detection limit and data issues
- Approaches to solving the mystery
 - Expanding the empirical dataset
 - Intensive process studies at selected lakes



MQ3: Did the 2007-8 survey accurately characterize the status of lakes in which only rainbow trout were collected?

- Minimally addressed
- Would require greater effort per lake
- Small dataset provides strong indication that rainbow trout do not indicate general status of mercury in the food web
- Significant information gap
- Prey fish a useful indicator for trout lakes



Discussion/Review Points

1. Was the study and the analysis technically sound?
2. Did we answer the management questions?
3. What important information gaps remain?



Next Steps

1. Written comments by May 4
2. Finalize technical report - June
3. Draft a fact sheet - June
4. BOG review of fact sheet
5. Finalize fact sheet



Item 4: Discussion: Draft Data Report on the 2015 Sampling

- Desired outcome: Obtain input on the report from the Review Panel and stakeholders via a group discussion.
- Written comments on the report requested by May 4.



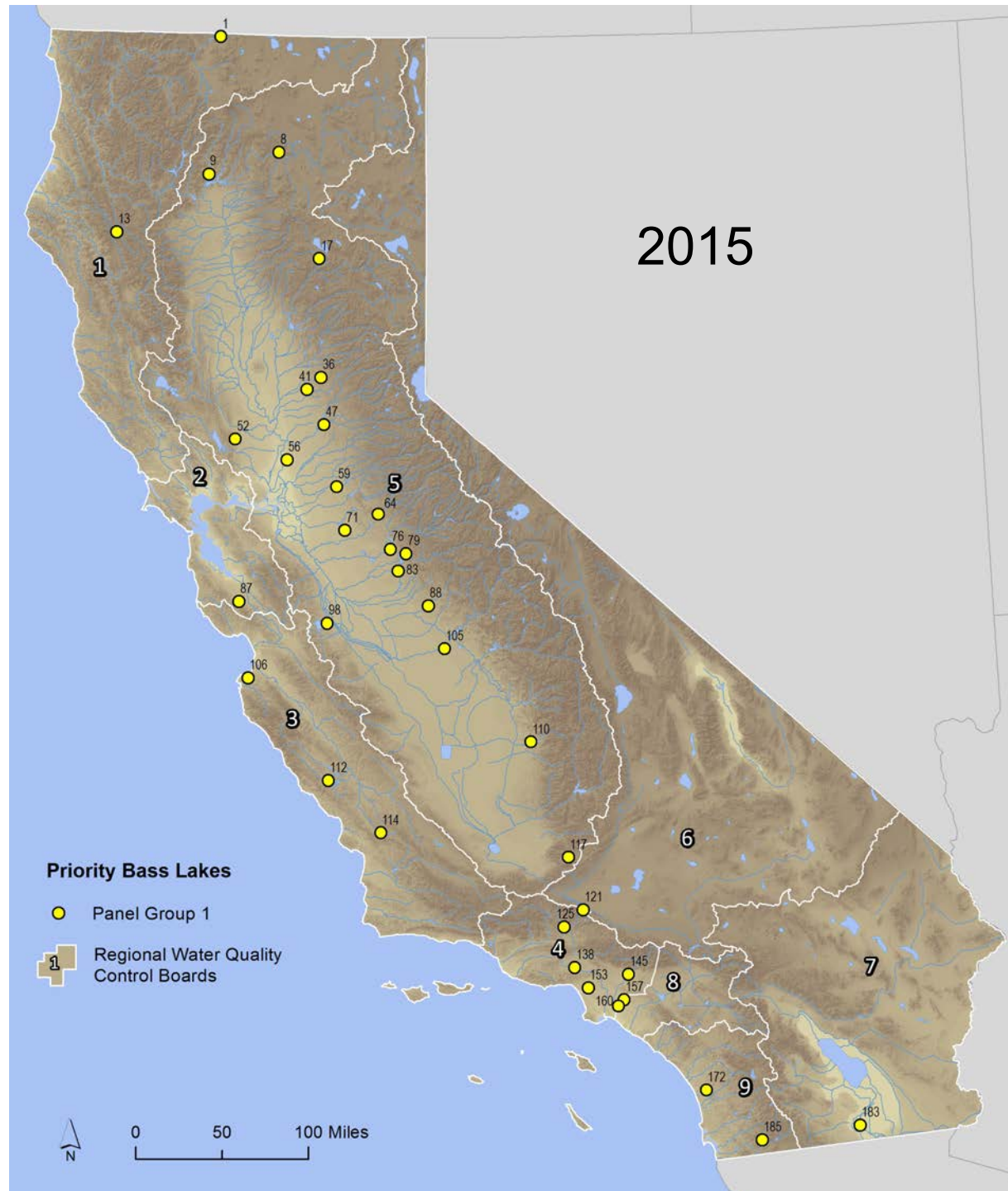
FINAL

**Sampling and Analysis Plan for
Long-term Monitoring of Bass Lakes
and Reservoirs in California**

The Bioaccumulation Oversight Group (BOG)

Surface Water Ambient Monitoring Program

June 2015



2017

Priority Bass Lakes

- Panel Group 2
- 1 Regional Water Quality Control Boards



0 50 100 Miles



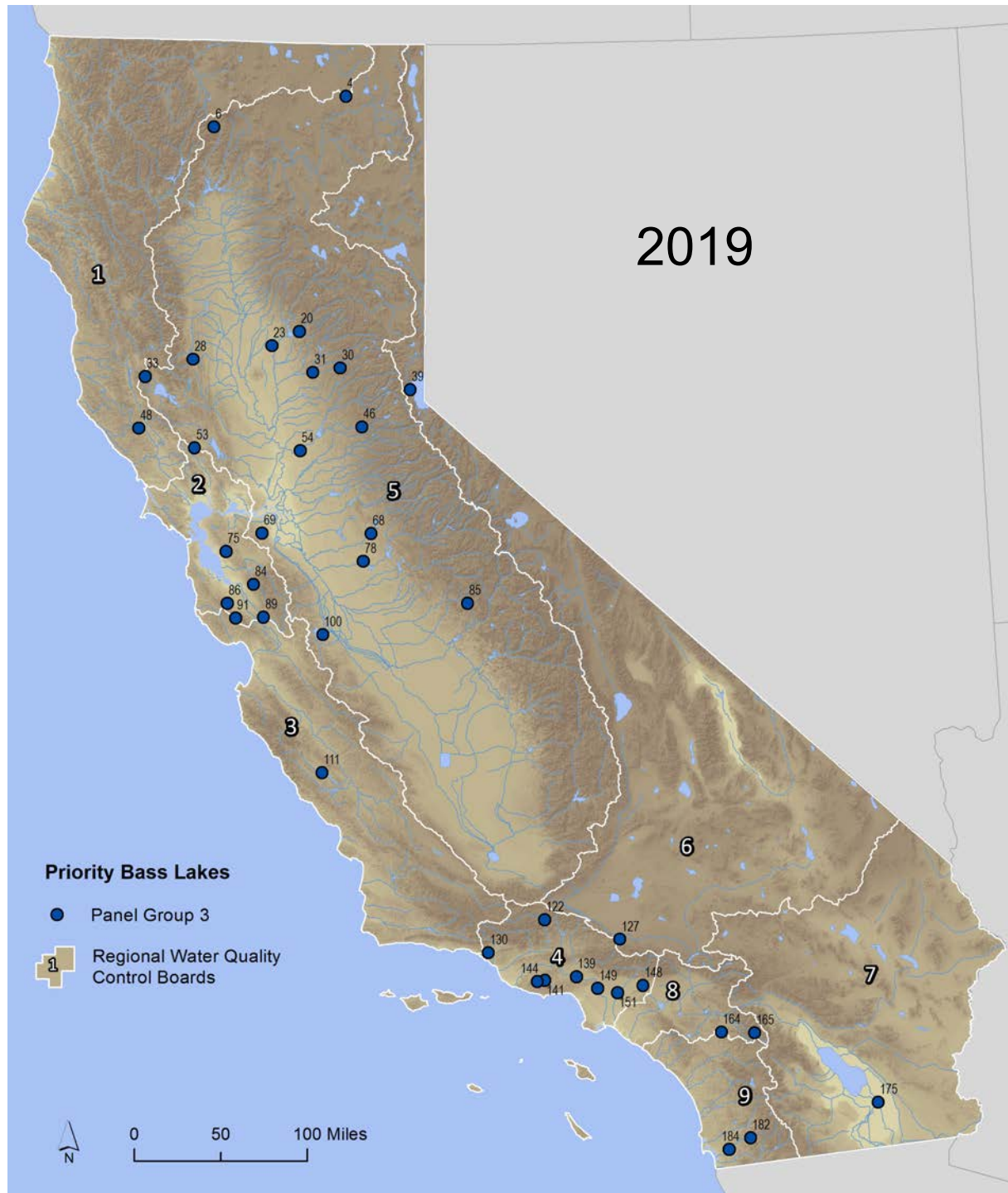
2019

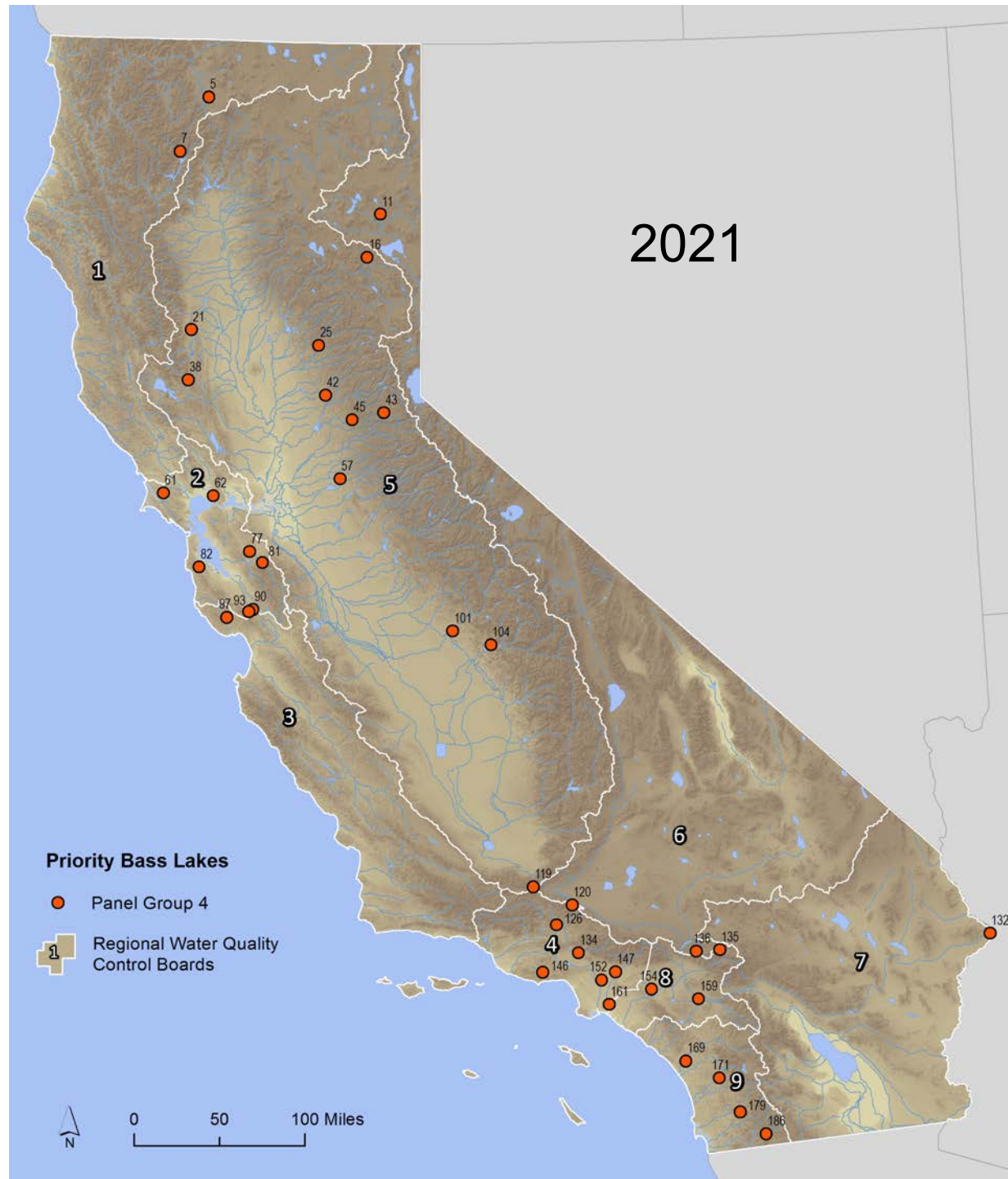
Priority Bass Lakes

- Panel Group 3
- 1 Regional Water Quality Control Boards



0 50 100 Miles





2023

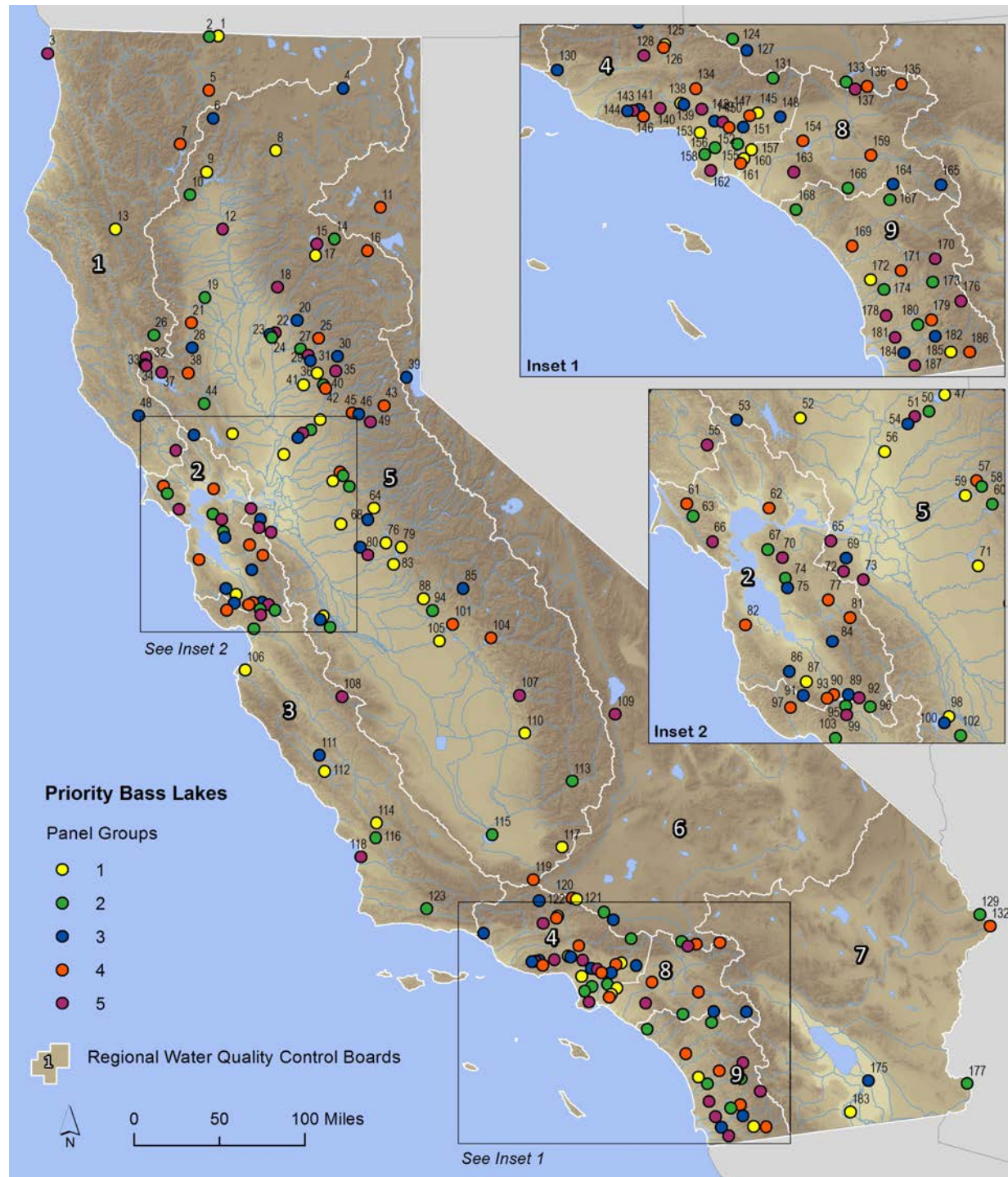
Priority Bass Lakes

- Panel Group 5
- 1 Regional Water Quality Control Boards



0 50 100 Miles

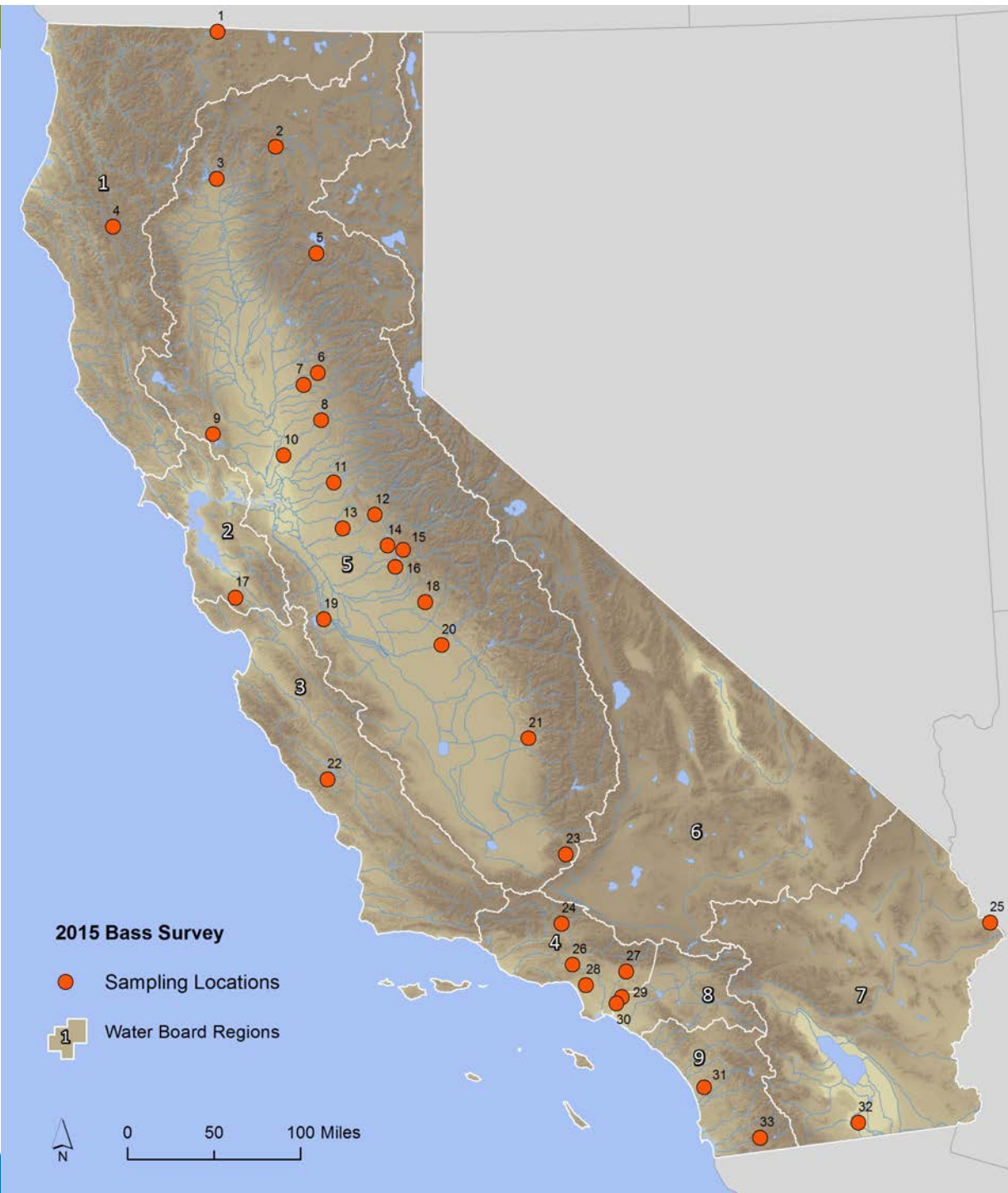




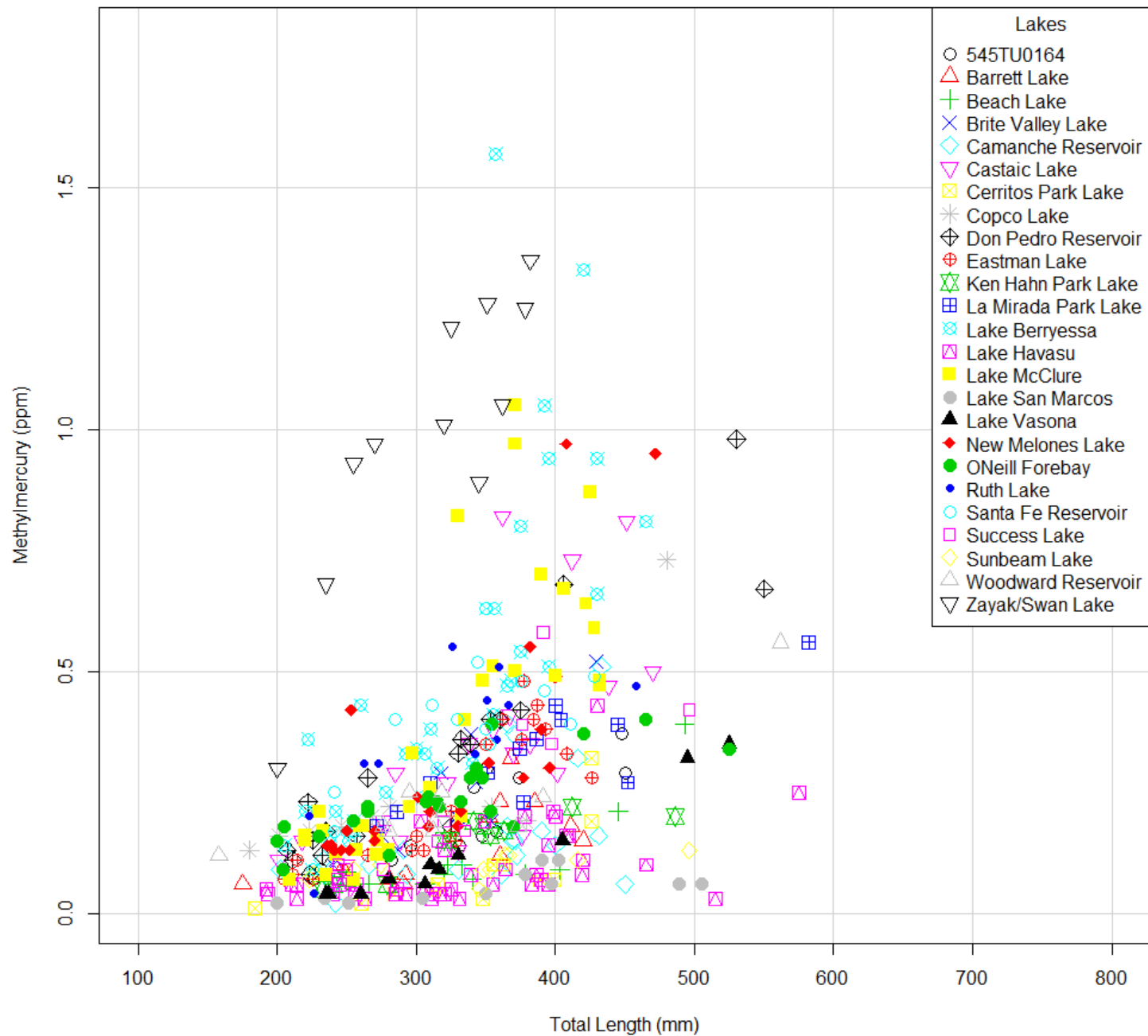
Design Summary

- Sport fish
 - Focus on bass and mercury
 - PCBs and OCs in bottom-feeder in selected lakes (20% for PCBs)
- Prey fish
 - Mercury in composites

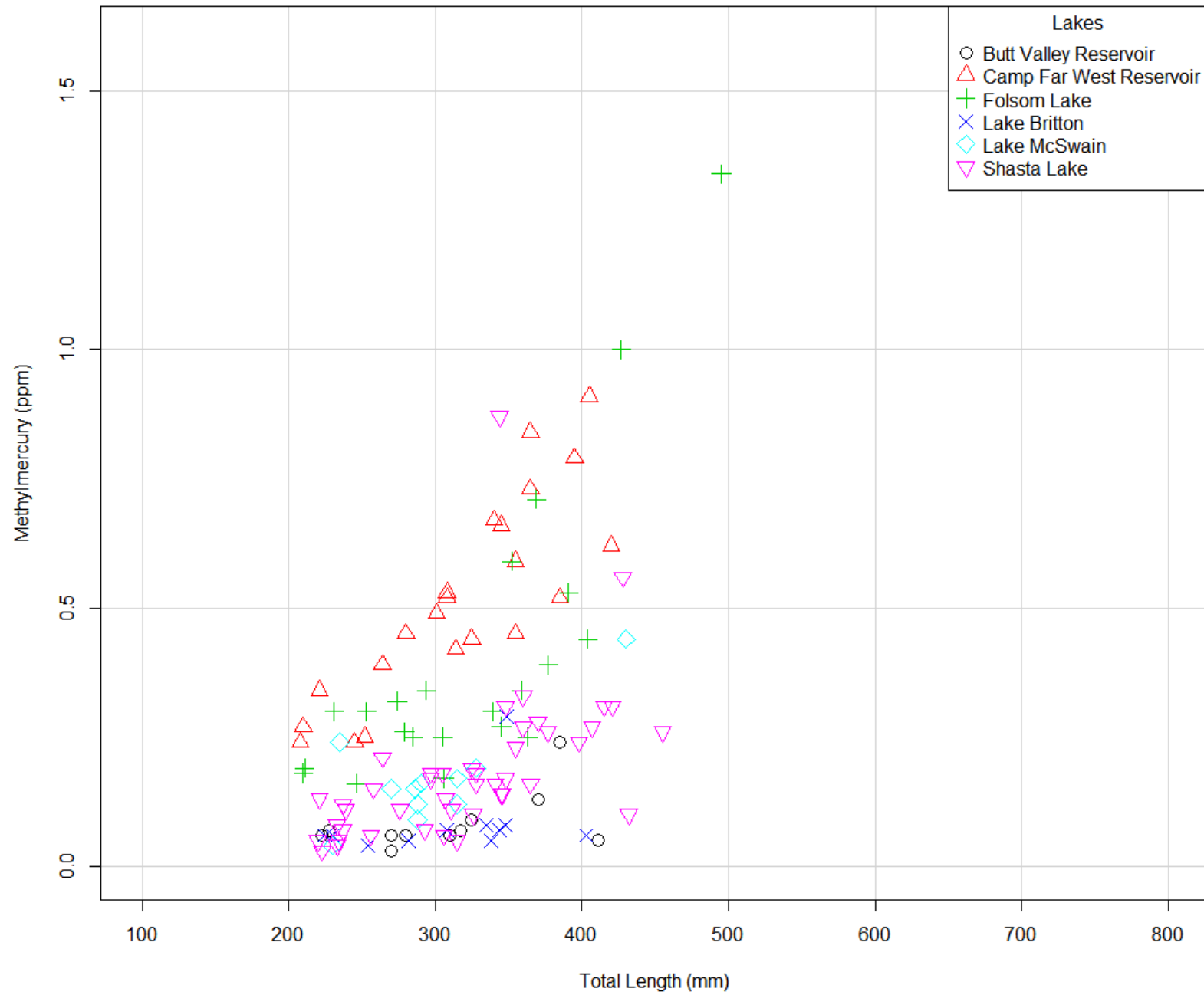




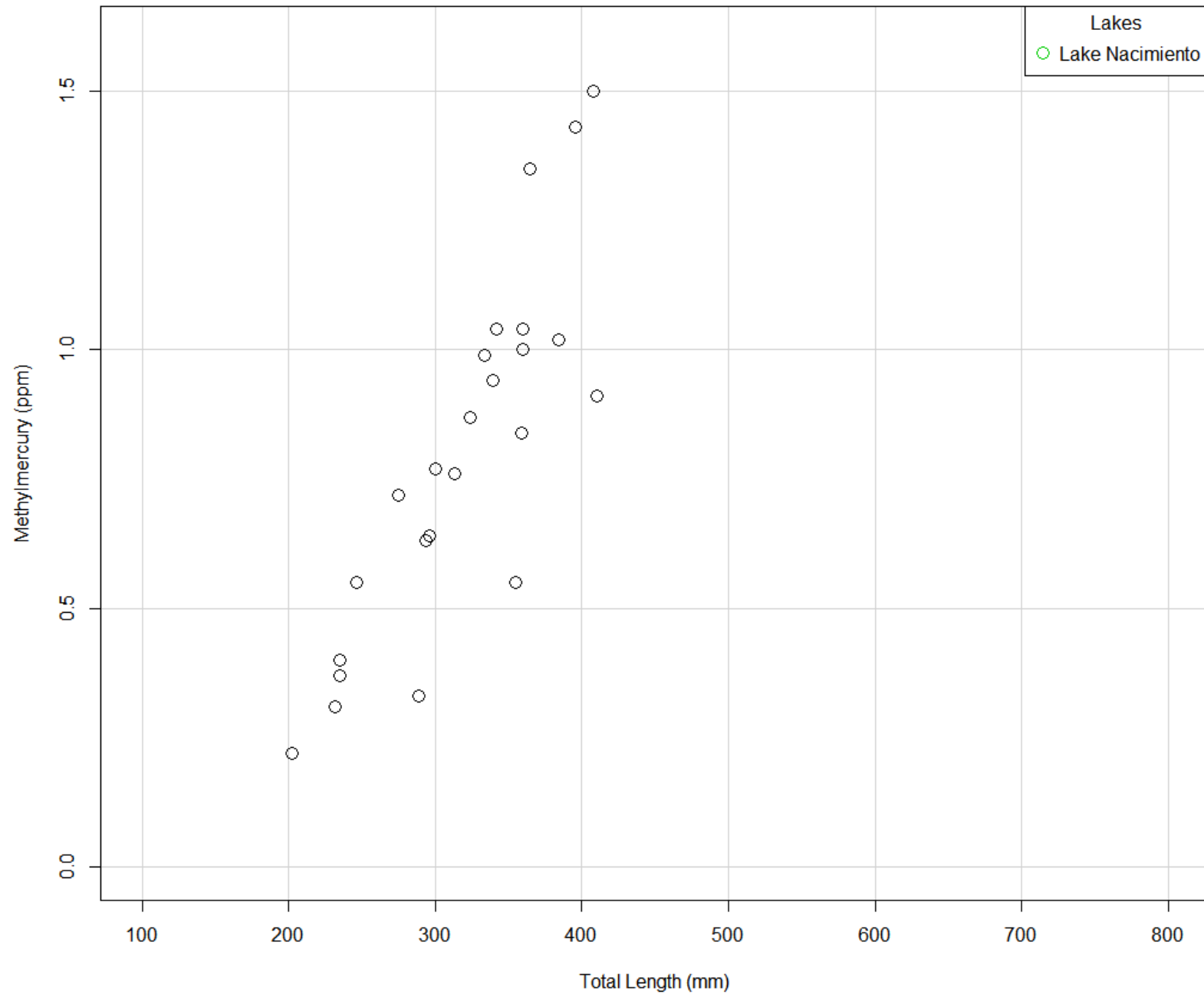
Largemouth Bass

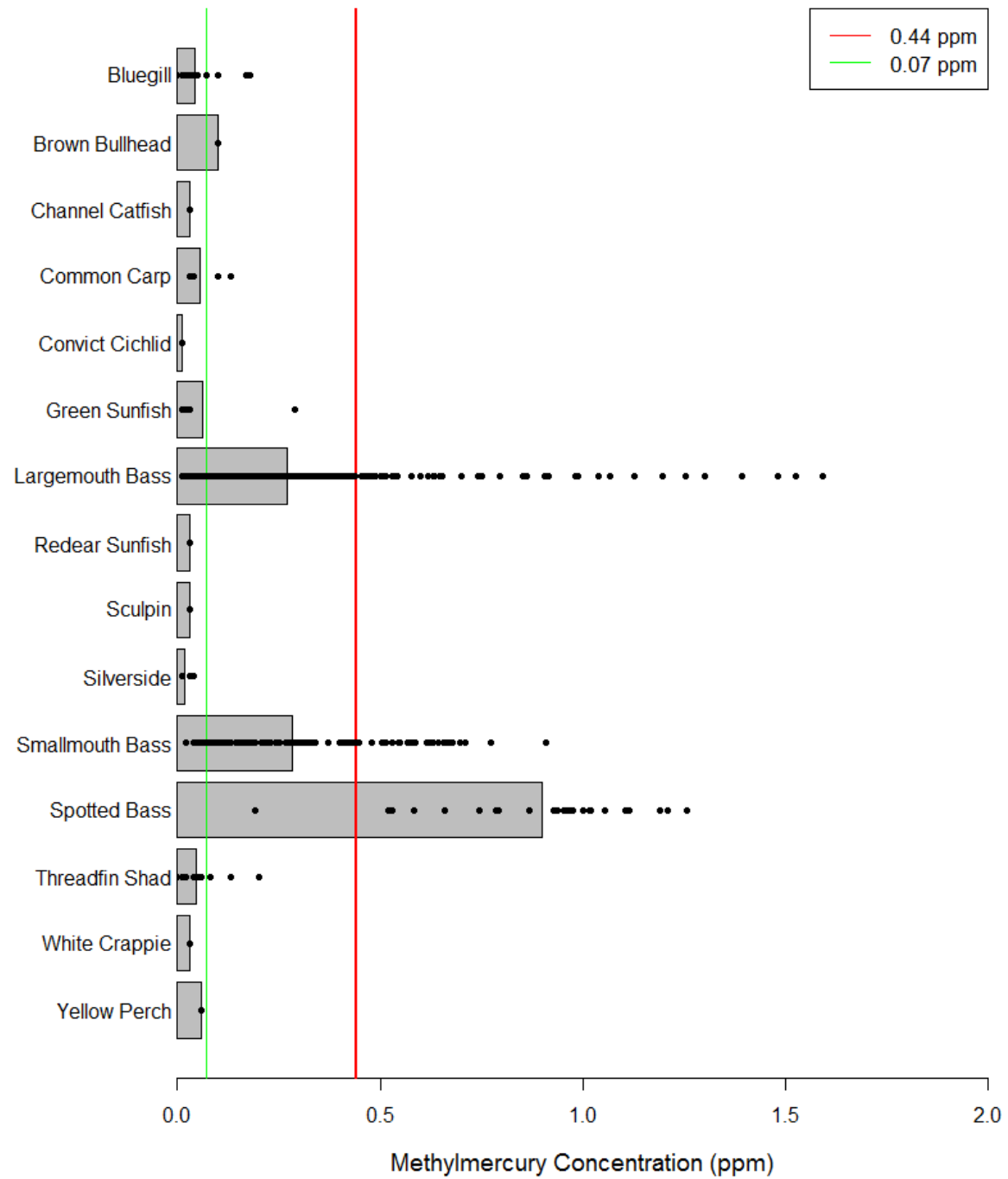


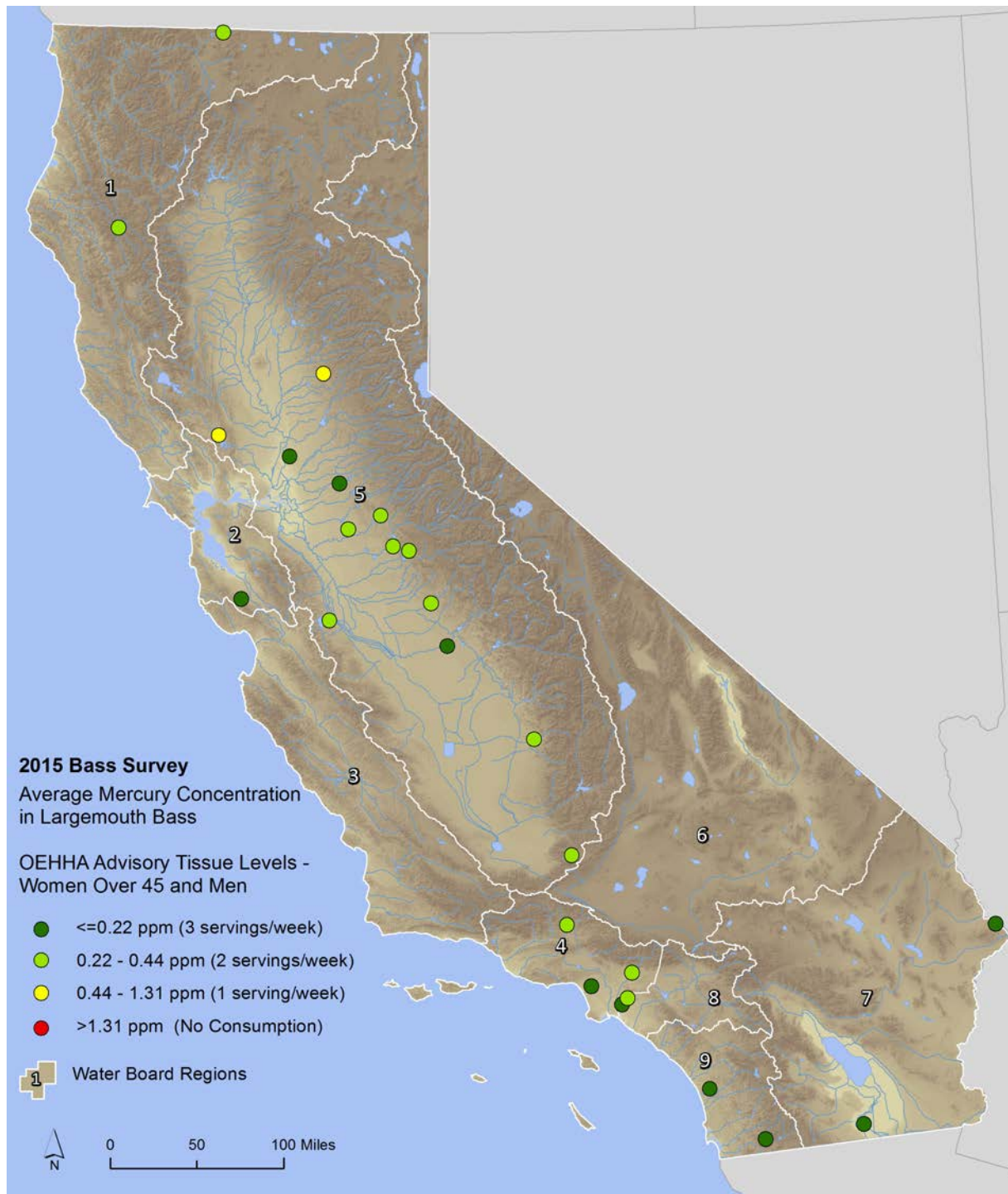
Smallmouth Bass

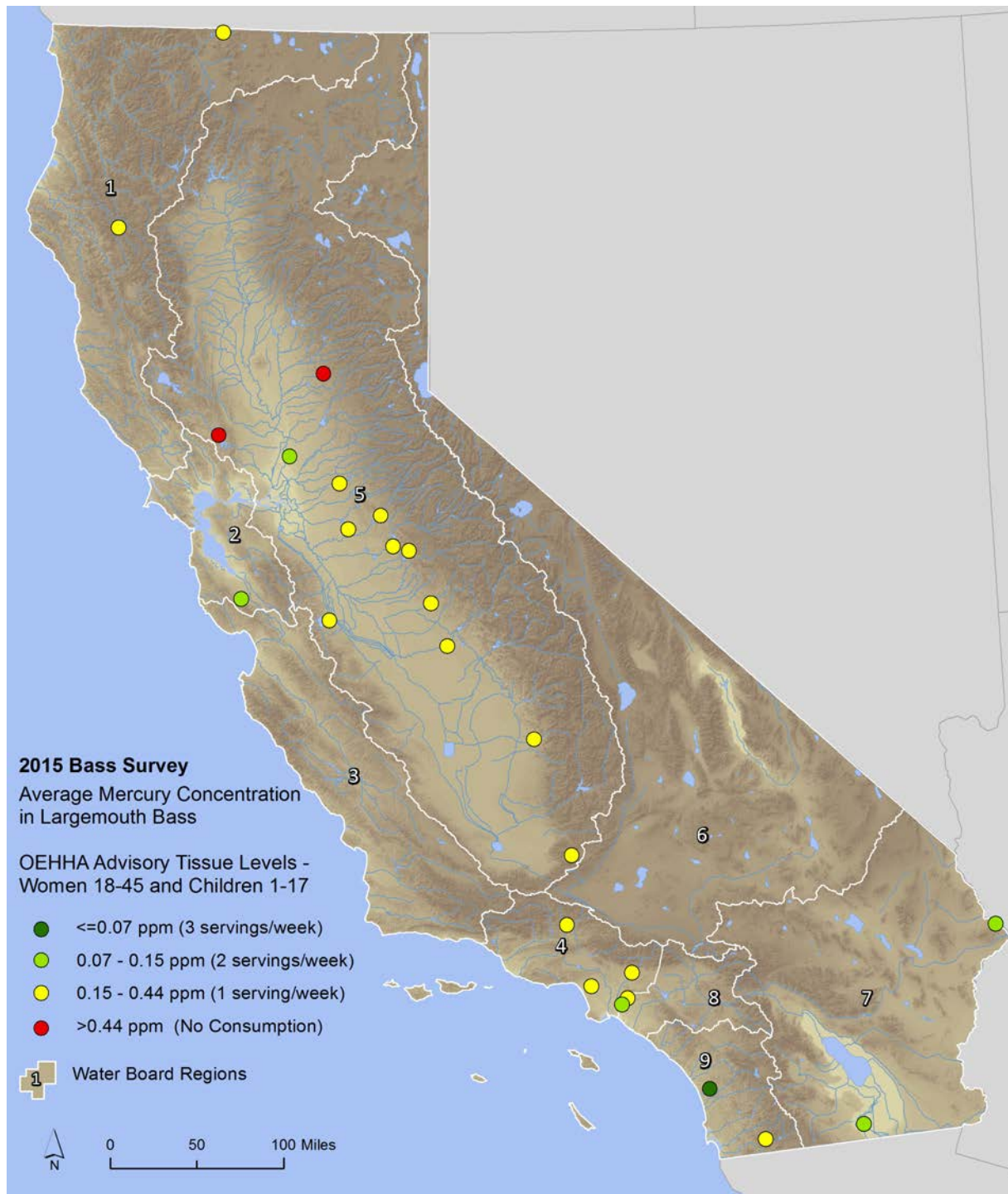


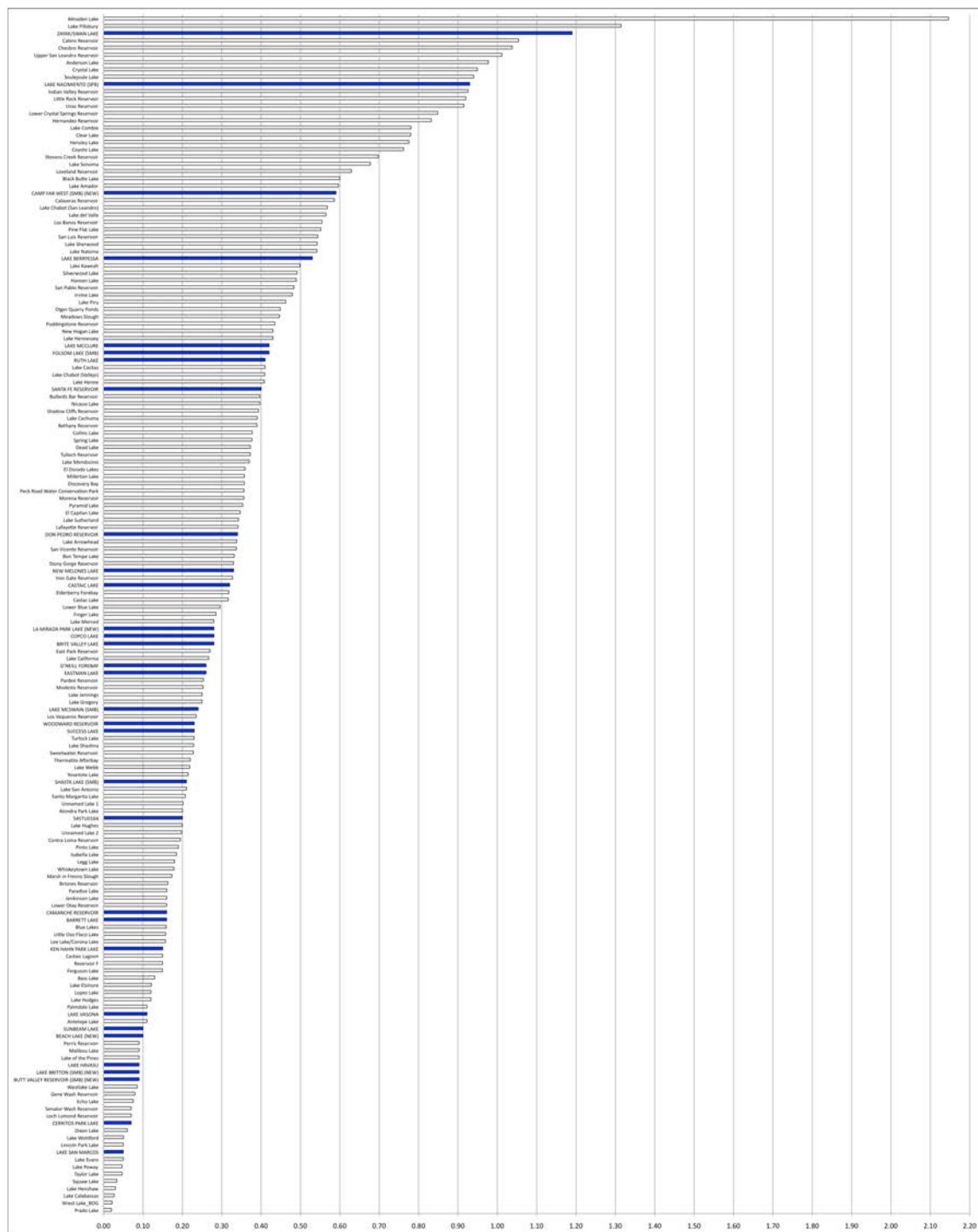
Spotted Bass











Overall Distribution

166 lakes

Average = 0.36 ppm

Median = 0.28 ppm

62% over 0.22 ppm

2015 Distribution

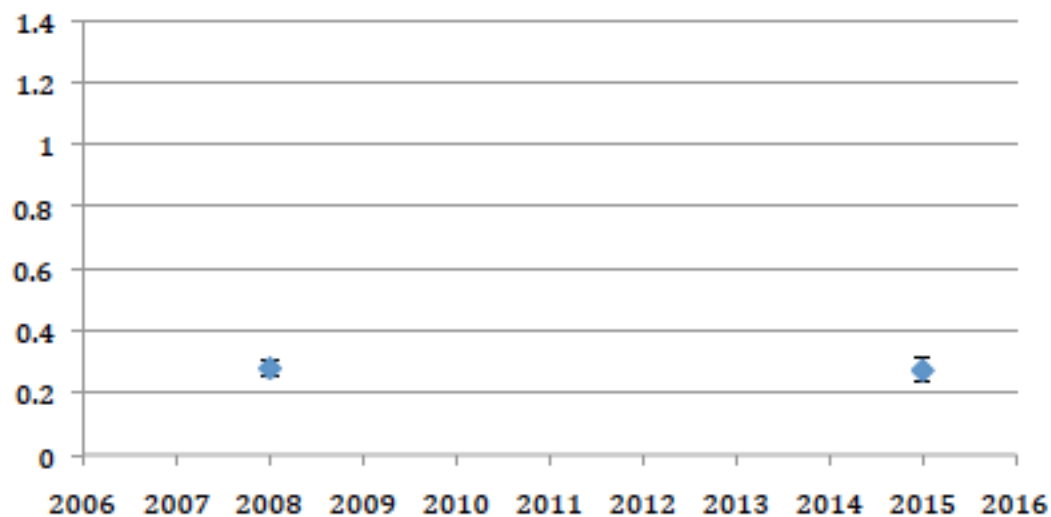
32 lakes

Average = 0.30 ppm

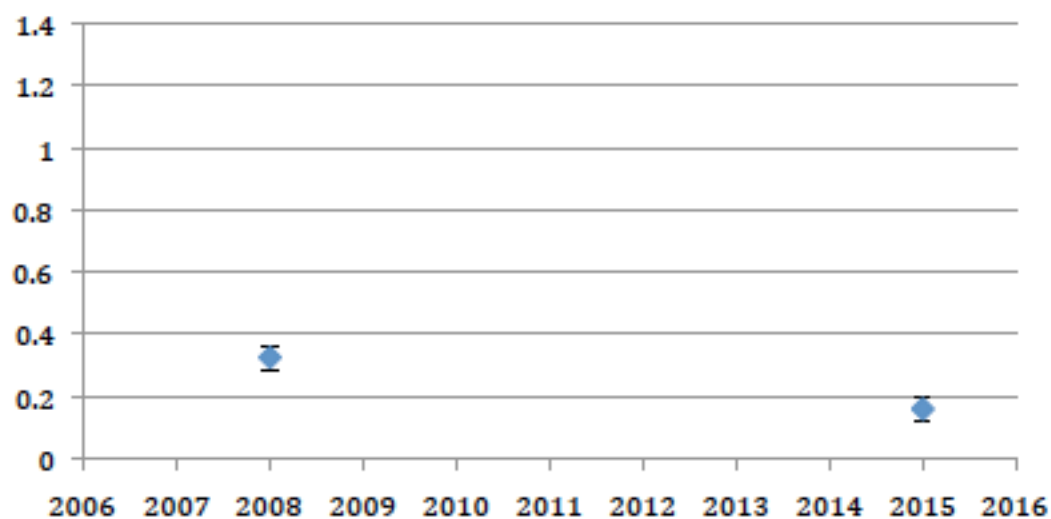
Median = 0.25 ppm

58% over 0.22 ppm

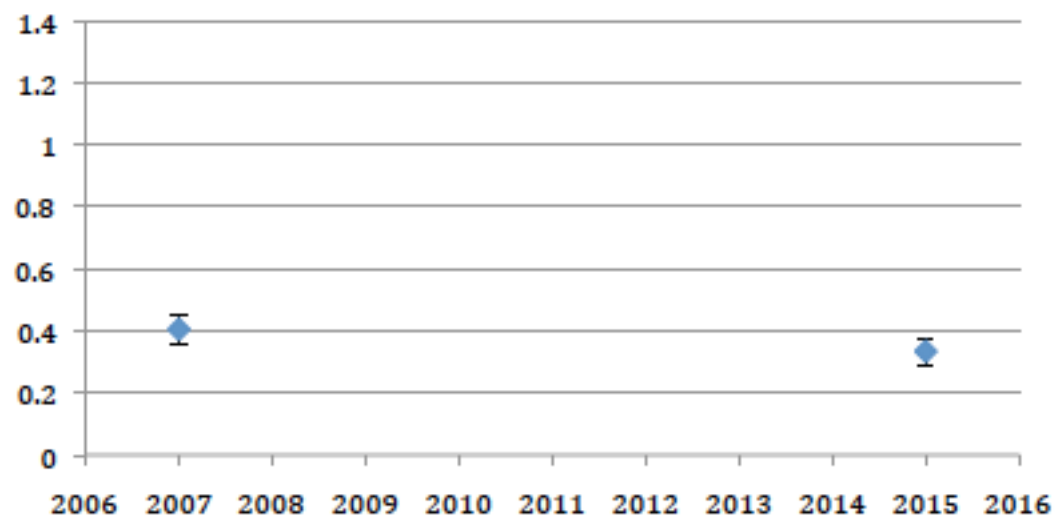
Brite Valley Lake



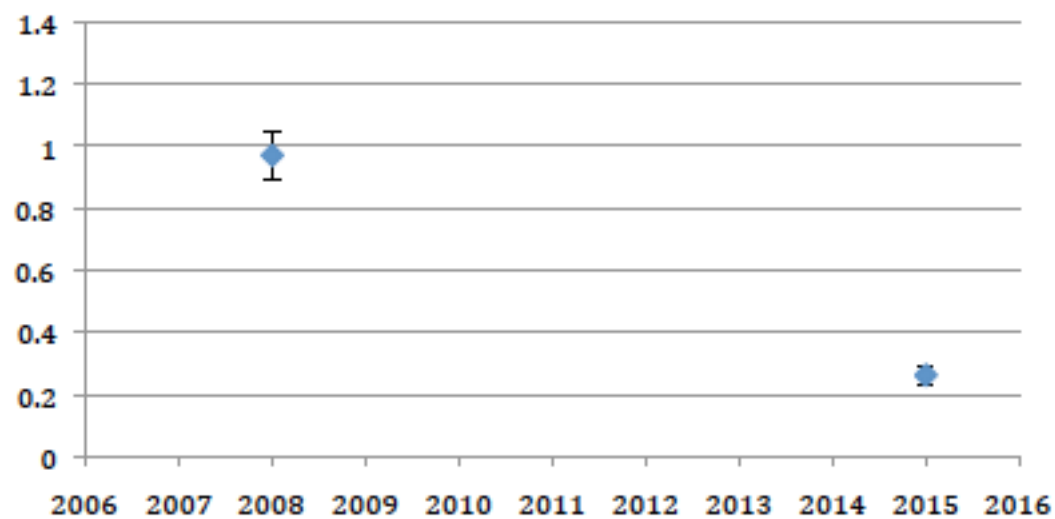
Camanche Reservoir



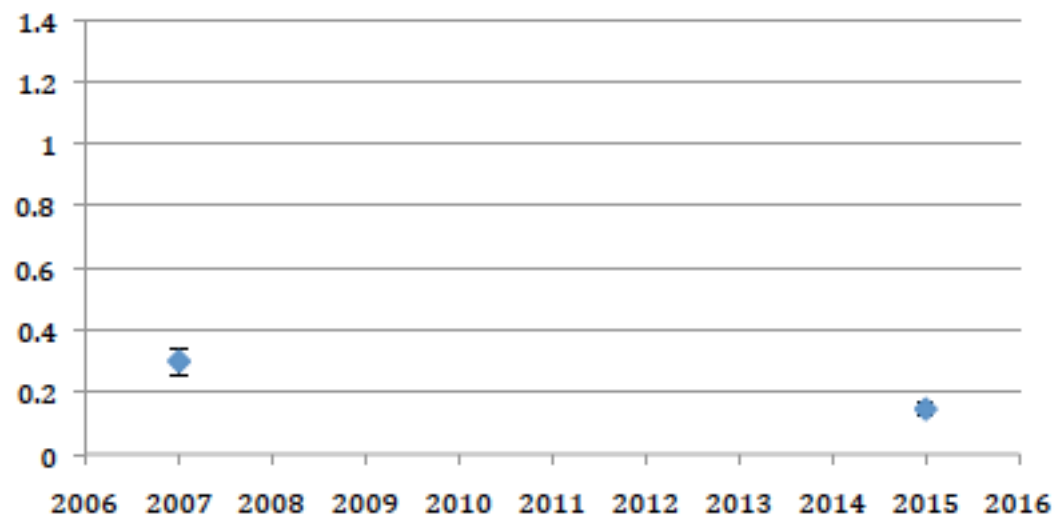
Don Pedro Reservoir



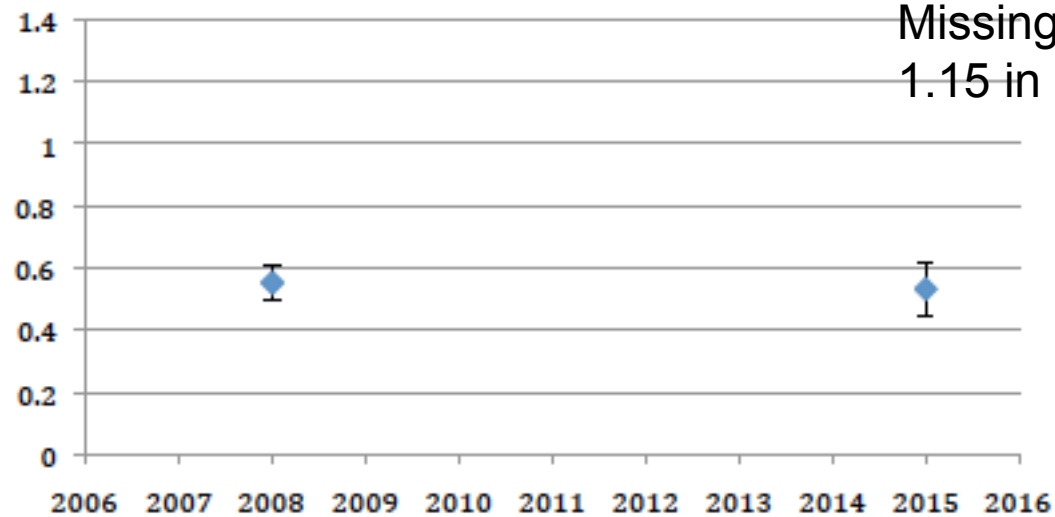
Eastman Lake



Ken Hahn Park Lake

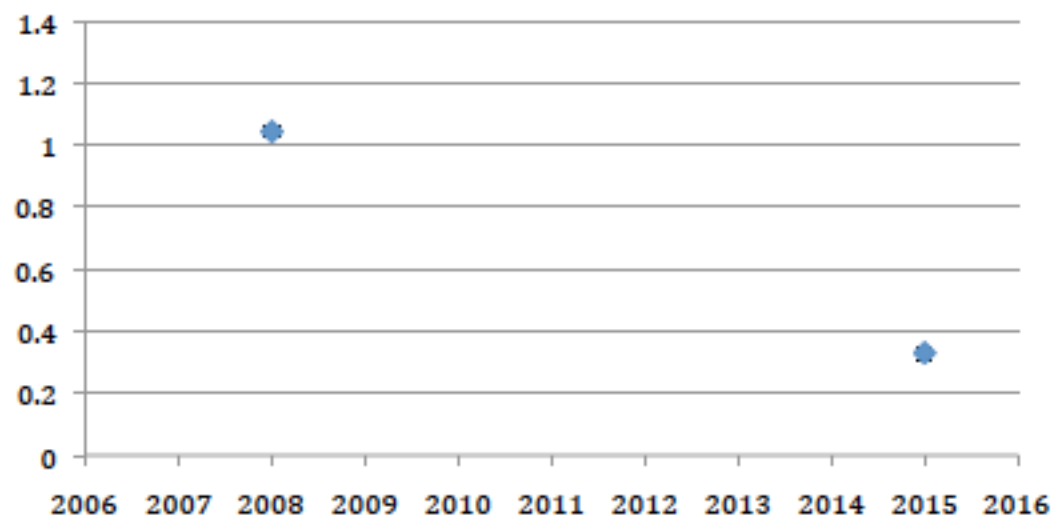


Lake Berryessa

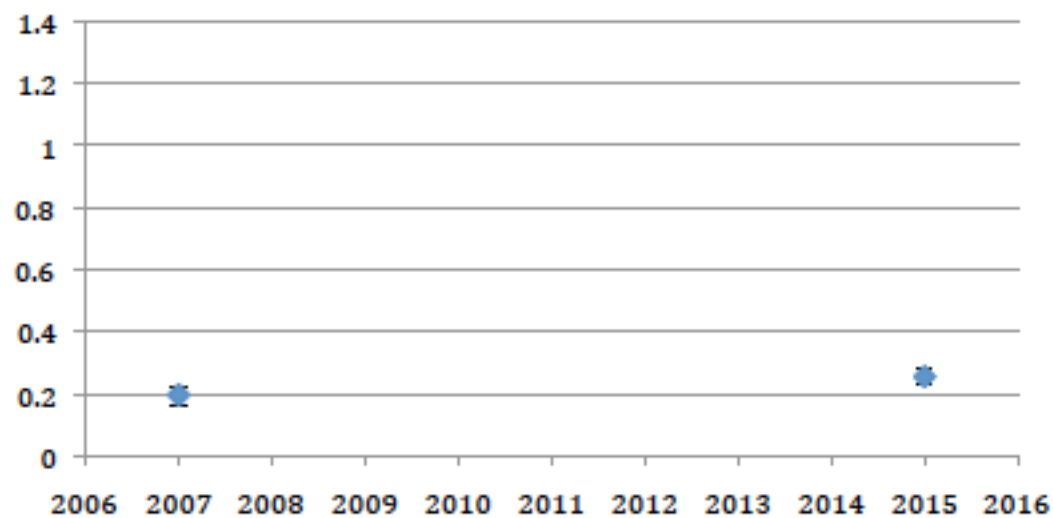


Missing a point
1.15 in 2012

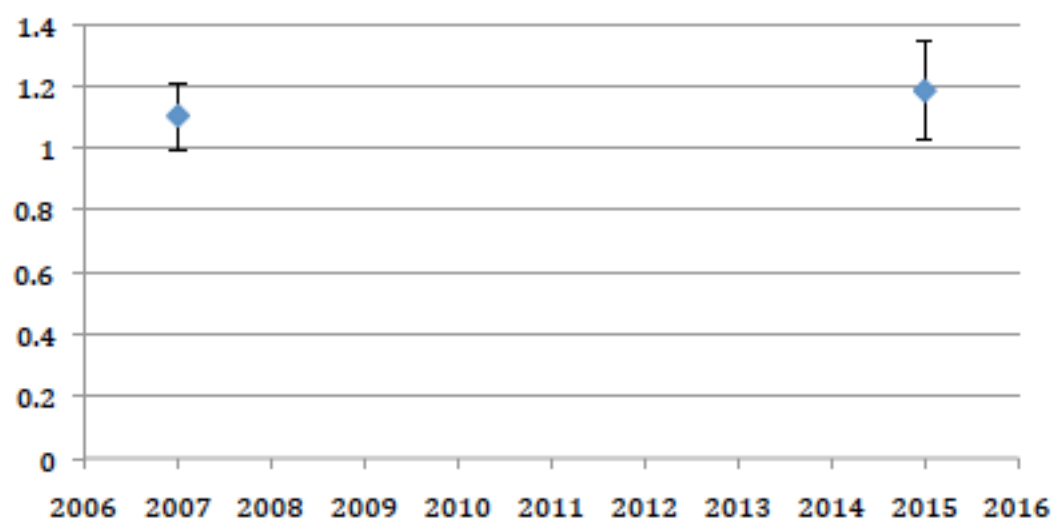
New Melones Lake

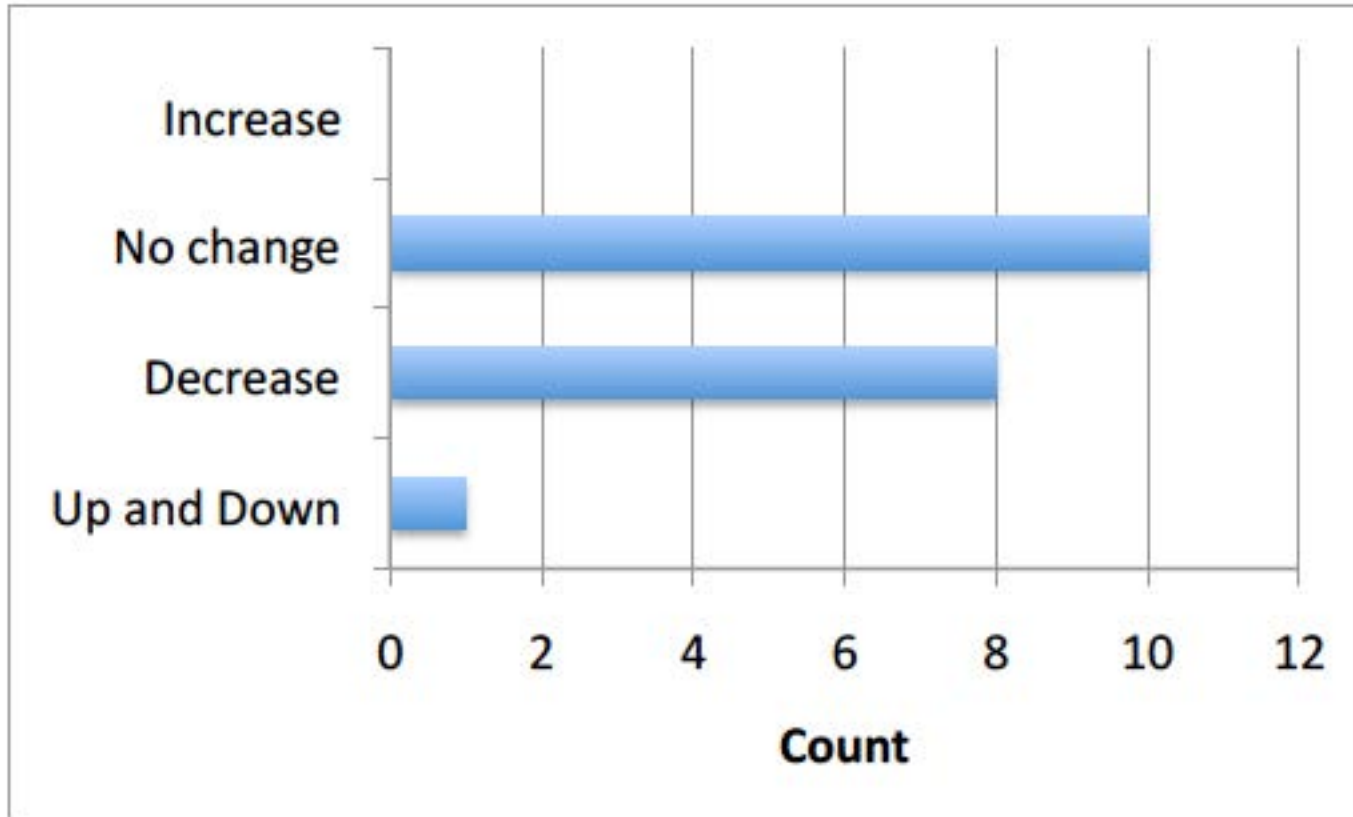


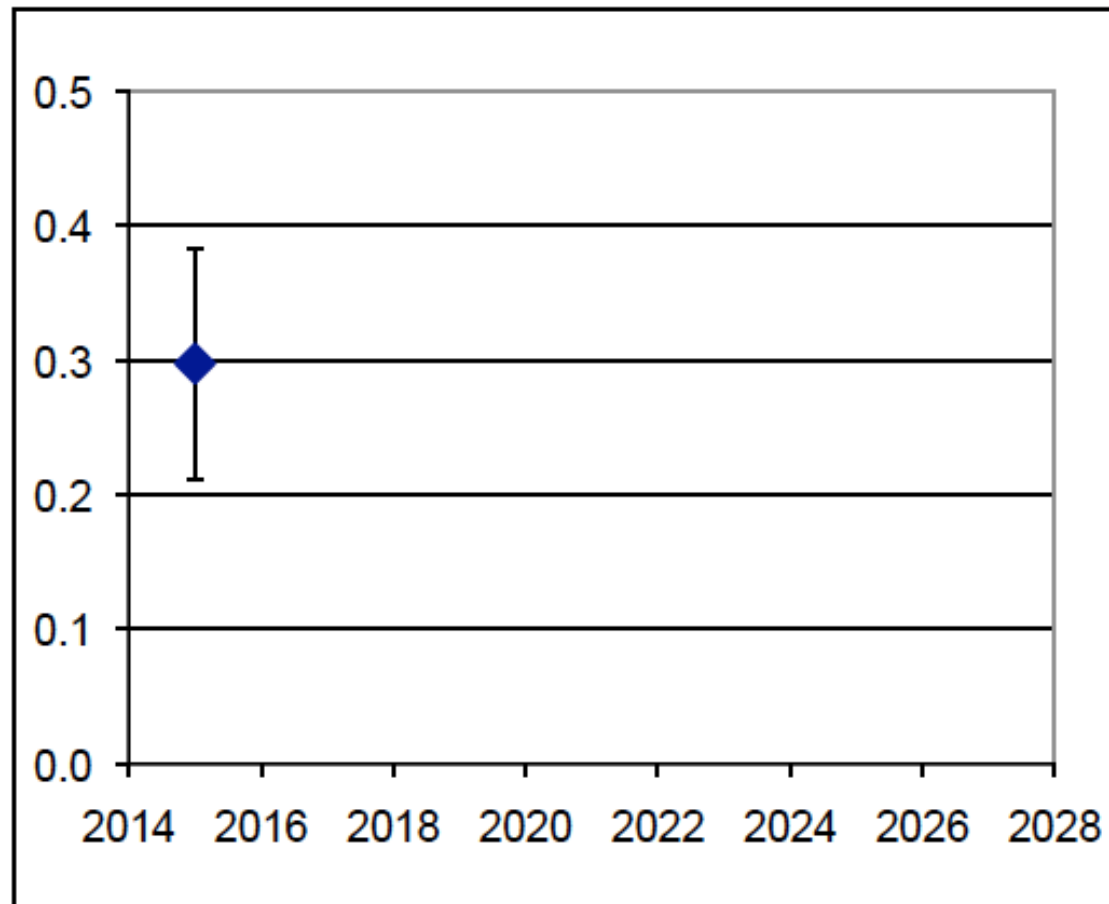
O'Neil Forebay



Zayak/Swan Lake

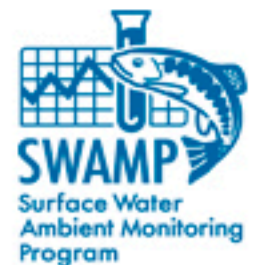






Discussion/Review Points

1. Is this the right content for a data report?
2. Thoughts on the dataset



Next Steps

1. Written comments by May 4
2. Finalize data report - June
3. Draft a fact sheet - June
4. BOG review of fact sheet
5. Finalize fact sheet



Item 5: Information: Update on the 2016 Sampling

- Desired outcome: Informed committee, agreement on timeline



2016 Lake Sampling Plan: Overview

- Long-term sport fish monitoring plan covers 187 previously sampled bass lakes, xx trout lakes, 68 coastal locations, and xx river and stream locations
- This sampling addressed:
 - Unsampled lakes
 - Lakes that have been sampled but where data gaps remain for 303(d) listing or advisory development

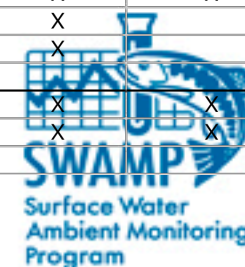


Sampling Design

- Unsampled lakes
 - Follows approach employed in 2007-2008
 - Supercompositing to save money
- Lake revisits
 - Follows explicit specifications from Regional Boards or Clean Lakes design
 - Analysis of all composites (where organics analysis is requested)
- All lakes
 - Detailed input from OEHHA



Region	Lake	Stienstra Rating	Bass, Trout, Both	Previously Sampled	Bass Pan	Regional Priority for 2016	Potential for Followup Based on Clean Lakes	Short List for 2016	Final List for 2016	Include PCBs	Include OC Pesticides
1	Freshwater Lagoon	7	Trout	-	-	High		X	X	X	X
1	Ewing Reservoir	4	Trout	-	-	High		X	X	X	X
1	Plaskett Lake	5	Neither (had)	2008	-	High		X	X		
2	Alpine Lake	3	Bass	-	-	3		X	X	X	X
2	Kent Lake	3	Bass	-	-	4		X	X	X	X
2	Lake Temescal	6	Bass	-	-	1		X	X	X	X
2	Stafford Lake	6	Bass	-	-	2		X	X	X	X
3	San Felipe Lake	-	Bass	-	-	High		X	X	X	X
3	Coyote Lake	-	Bass	2008	-	High		X	X		X
3	White Lake	-	Trout	-	-	High		X	X	X	X
3	Pacheco Lake	-	?	-	-	High		X	X	X	X
3	Whale Rock Reservoir	2	Trout, other	-	-	High		X	X	X	X
3	Loch Lomond Reservoir	7	Bass	2008, 2014	2021	??	X	??	??		
5	Spaulding, Lake		Trout	2008	-	1		X	X		
5	Union Valley Reservoir		Both	2008	2021	2		X	X		
5	Fordyce Lake		Trout	-	-	3		X	X	X	X
5	Sly Creek Reservoir		Trout	-	-	4		X	X	X	X
5	Wishon Reservoir		Trout	2007	-	5		X	X		
5	Little Grass Valley Reservoir		Trout, Bullhead	2008	-	6		X	X		
6	Crater Lake		Trout	2007	-	Highest		X	X		
6	South Lake		Trout	-	-	Highest		X	X	X	X
6	Lower Echo Lake - El Dorado County		Trout	-	-	Highest		X	X	X	X
6	Red Lake - Alpine County		Trout	-	-	Highest		X	X	X	X
6	Diaz Lake - Lone Pine	5	Bass	-	-	Highest		X	X	X	X
6	Hesperia Lake - Hesperia		Bass	-	-	Highest		X	X	X	X
7	Salton Sea		Tilapia	2007	-	1		X	X		
7	Finney Lake		Bass	2014	-	4	X	X	X		X
7	Squaw Lake		Bass	2014	-	2	X	X	X		
7	Senator Wash Reservoir		Bass	2007, 2014	-	??	X	??	??		
7	Taylor Lake		Bass	2014	-	3	X	X	X		
7	Wiest Lake		Bass	2004, 2007, 2014	2019	??	X	??	??		
8	Big Bear Lake		Bass	2004, 2005, 2007	2021	High		X	X	X	X
8	Irvine Lake		Bass	2007	2023	High		X	X	X	
8	Lee Lake		Bass	2008	-	High		X	X	X	
8	Lake Hemet		Trout	2008	2019	High		X	X	X	
9	Diamond Valley Lake		Bass	-	2019	High		X	X	X	X
9	Lake Murray (Murray Reservoir)		Bass	-	2023	High		X	X	X	X
9	Dixon Lake		Bass	2008, 2014	-	??	X	??	??		



N=38

Other Parameters

- Prey fish - yes
- Sediment - no
- Water - no



Timeline for Releasing the 2016 Data

- Sampling – Completed in October 2016
- Analysis
 - Mercury – reported to SWAMP
 - Organics – reported to SWAMP
 - Aging – end of April
 - Selenium - ?
- State Board QA review and upload to CEDEN
- SFEI review and data report/fact sheet generation
- BOG review
- Upload to Portal, release fact sheet



Item 6: Decision - Sampling Plan for 2017 - Round 2 of the Long-term Bass Lake Monitoring Program

- Desired outcome: Finalized plan for sampling in 2017.



2017

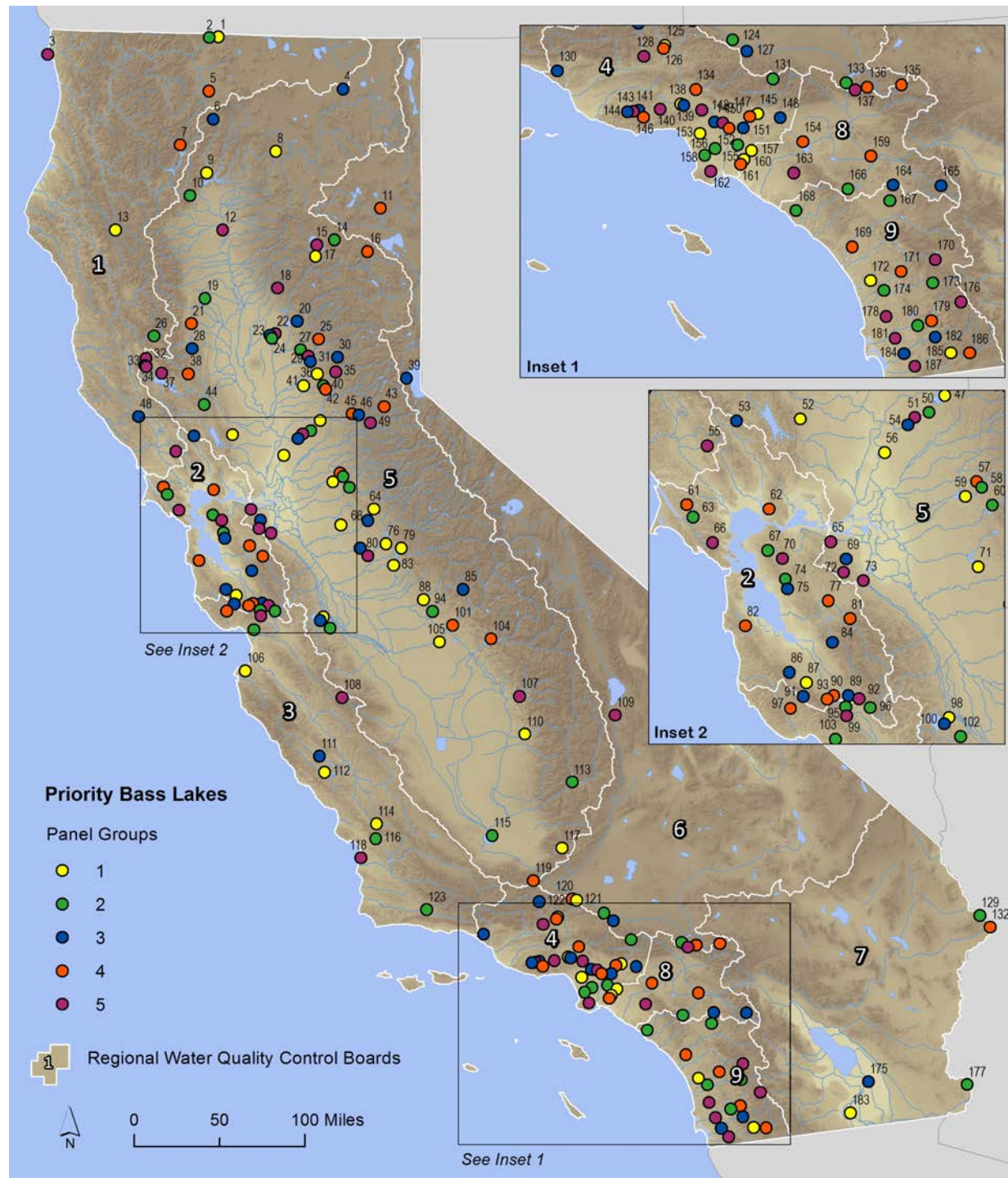
Priority Bass Lakes

- Panel Group 2
- 1 Regional Water Quality Control Boards



0 50 100 Miles





Design Summary

- Sport fish
 - Focus on bass and mercury
 - PCBs and OCs in bottom-feeder in selected lakes (20% for PCBs)
 - *New*: Selenium in composites of all species
- Prey fish
 - Mercury and selenium (*New*) in composites



Panel	Region	Map Label Number	Lake Name	Include PCBs	Include OC Pesticides	Algal toxins	County	siteID (draw #)	Latitude	Longitude	SizeClass	Reasoning	Priority	Region 5 Priority Ranking
2	1	2	Iron Gate Reservoir				Siskiyou	EQUAL-020	41.972	-122.4	S			
2	1	26	Pillsbury, Lake				Lake	EQUAL-030	39.427	-122.93	M			
2	2	74	Upper San Leandro Reservoir				Alameda, Contra Costa	EQUAL-008	37.776	-122.12	S	NLA lake		
2	2	67	San Pablo Reservoir				Contra Costa	EQUAL-024	37.923	-122.24	S			
2	2	63	Nicasio Lake				Marin	EQUAL-031	38.086	-122.73	S	NLA lake		
2	2	96	Coyote Lake				Santa Clara	EQUAL-032	37.121	-121.55	S			
2	3	123	Cachuma, Lake				Santa Barbara	EQUAL-006	34.594	-119.94	L			
2	3	103	Pinto Lake		X		Santa Cruz	EQUAL-012	36.956	-121.77	S			
2	3	95	Chesbro Reservoir	X			Santa Clara	EQUAL-028	37.123	-121.71	S			
2	3	116	Lopez Lake				San Luis Obispo	EQUAL-036	35.197	-120.47	S			
2	4	131	Crystal Lake				Los Angeles	EQUAL-002	34.319	-117.85	S			
2	4	155	Wilderness Park Lake				Los Angeles	EQUAL-009	33.937	-118.1	S			
2	4	156	Magic Johnson Lakes	X				EQUAL-025	33.919	-118.26	S			
2	4	158	Alondra Park Lake	X			Los Angeles	EQUAL-037	33.881	-118.33	S		red = high priority sampling	
2	5	60	New Hogan Lake				Calaveras	EQUAL-003	38.175	-120.77	L		blue = lower priority sampling	
2	5	10	Whiskeytown Lake				Shasta	EQUAL-004	40.626	-122.58	L			
2	5	50	Natomas, Lake	X	X		Sacramento	EQUAL-007	38.650	-121.19	S		Exceeds	High 2
2	5	113	Isabella Lake	X	X		Kern	EQUAL-010	35.666	-118.43	L		Exceeds	High 1
2	5	24	Mile Long Pond	X			Butte	EQUAL-011	39.429	-121.63	S		Near Im	Low 5
2	5	19	Black Butte Lake				Tehama, Glenn	EQUAL-014	39.758	-122.38	S			
2	5	44	Davis Creek Reservoir	X	X		Yolo	EQUAL-015	38.859	-122.36	S		No data,	Very Low 8
2	5	102	Los Banos Reservoir		X		Merced	EQUAL-016	36.980	-120.96	S		Exceeds	High 4
2	5	58	Pardee Reservoir	X	X		Amador, Calaveras	EQUAL-019	38.266	-120.84	M		No data,	Very Low 7
2	5	115	Webb, Lake	X	X		Kern	EQUAL-022	35.223	-119.26	S		Exceeds	High 3
2	5	14	Mountain Meadows Reservoir	X			Lassen	EQUAL-023	40.274	-120.96	M	completely drained	Near Im	Low 6
2	5	27	Collins Lake				Yuba	EQUAL-027	39.336	-121.32	S			
2	5	40	Lake of the Pines				Nevada	EQUAL-035	39.036	-121.06	S			
2	5	94	Hensley Lake				Madera	EQUAL-038	37.127	-119.88	M			
2	6	124	Palmdale Lake	X			Los Angeles	EQUAL-018	34.551	-118.12	S	Covered by separate project?		
2	6	133	Silverwood Lake	X			San Bernardino	EQUAL-034	34.285	-117.33	S	R6 interested in crappie, carp, bullhead, and koi		
2	7	177	Ferguson Lake				Imperial	EQUAL-017	32.972	-114.5	S			
2	8	166	Elsinore, Lake	X	X	?	Riverside	EQUAL-021	33.667	-117.34	M	R8 requests microcystin and cylindrospermopsis		
2	9	167	Lake Skinner				Riverside	EQUAL-005	33.589	-117.05	S			
2	9	174	Hodges, Lake				San Diego	EQUAL-013	33.068	-117.11	S			
2	9	180	Jennings, Lake				San Diego	EQUAL-026	32.859	-116.89	S			
2	9	168	Laguna Niguel Park Lake				Orange	EQUAL-029	33.547	-117.71	S			
2	9	173	Sutherland, Lake				San Diego	EQUAL-033	33.102	-116.77	S			
	8		Lake Evans	X								Catfish only. Would support an advisory.		
Count	38													

Bass 2017: Which Lakes?

- List may shift a bit depending on budget
- Include Lake Evans? – PCBs and mercury in catfish



Bass 2017: Other Details

- Contract ends Dec 2017 - Organics samples must be submitted by September 1 – need to enter values in Lori's spreadsheet by tomorrow - lakes with organics will be sampled earlier
- Need to incorporate detailed input on fish species and counts, and analytes from OEHHA to support advisory development
- Will document final target lake/analyte list and deviations from the 2015 Sampling Plan in an addendum to be sent out next week

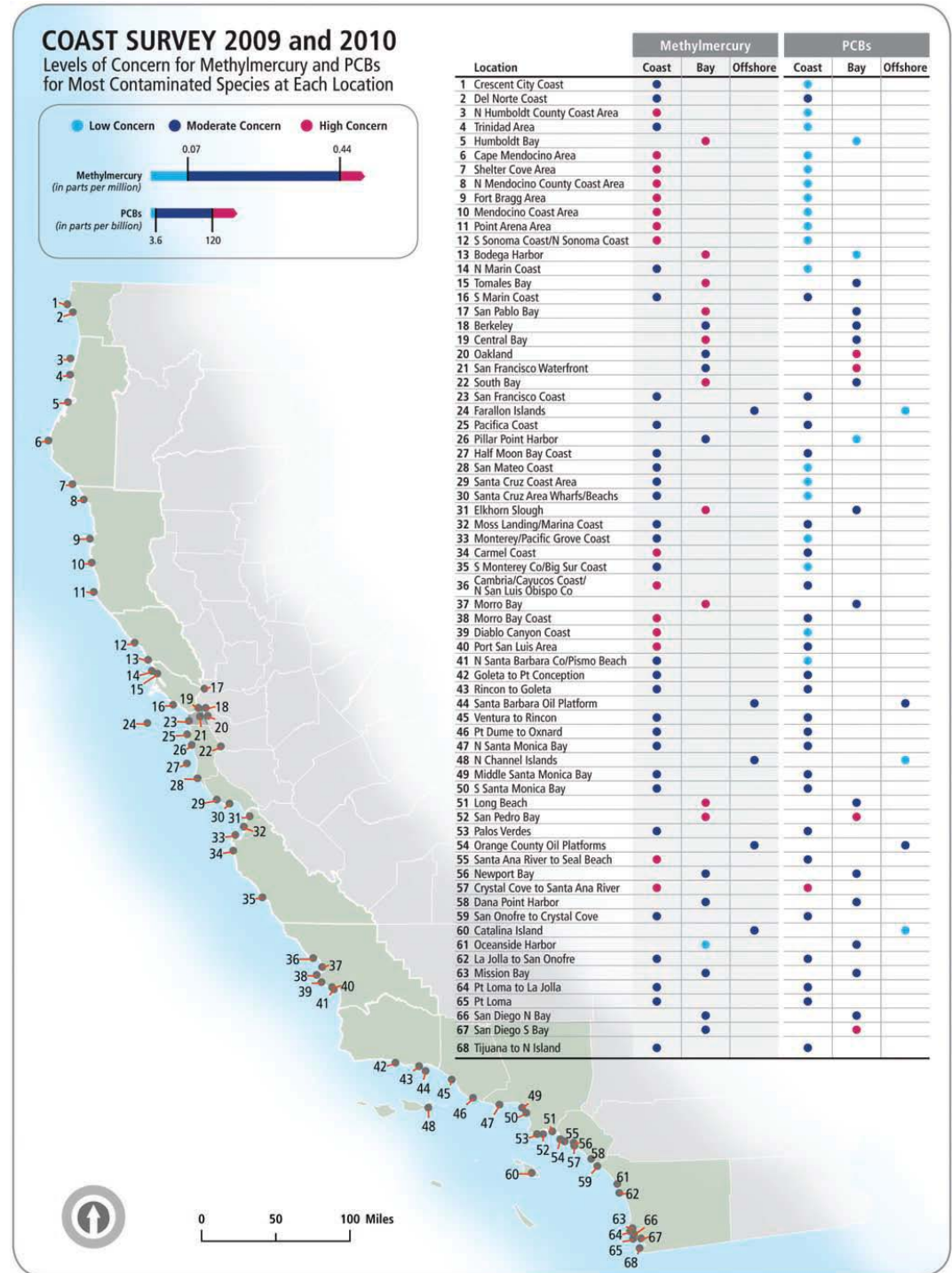


Item 7: Decision: Sampling Plan for 2018 - The Southern California Bight Revisited

- Desired outcomes: Obtain input on the plan from the Review Panel and stakeholders via a group discussion; decision on organics analysis

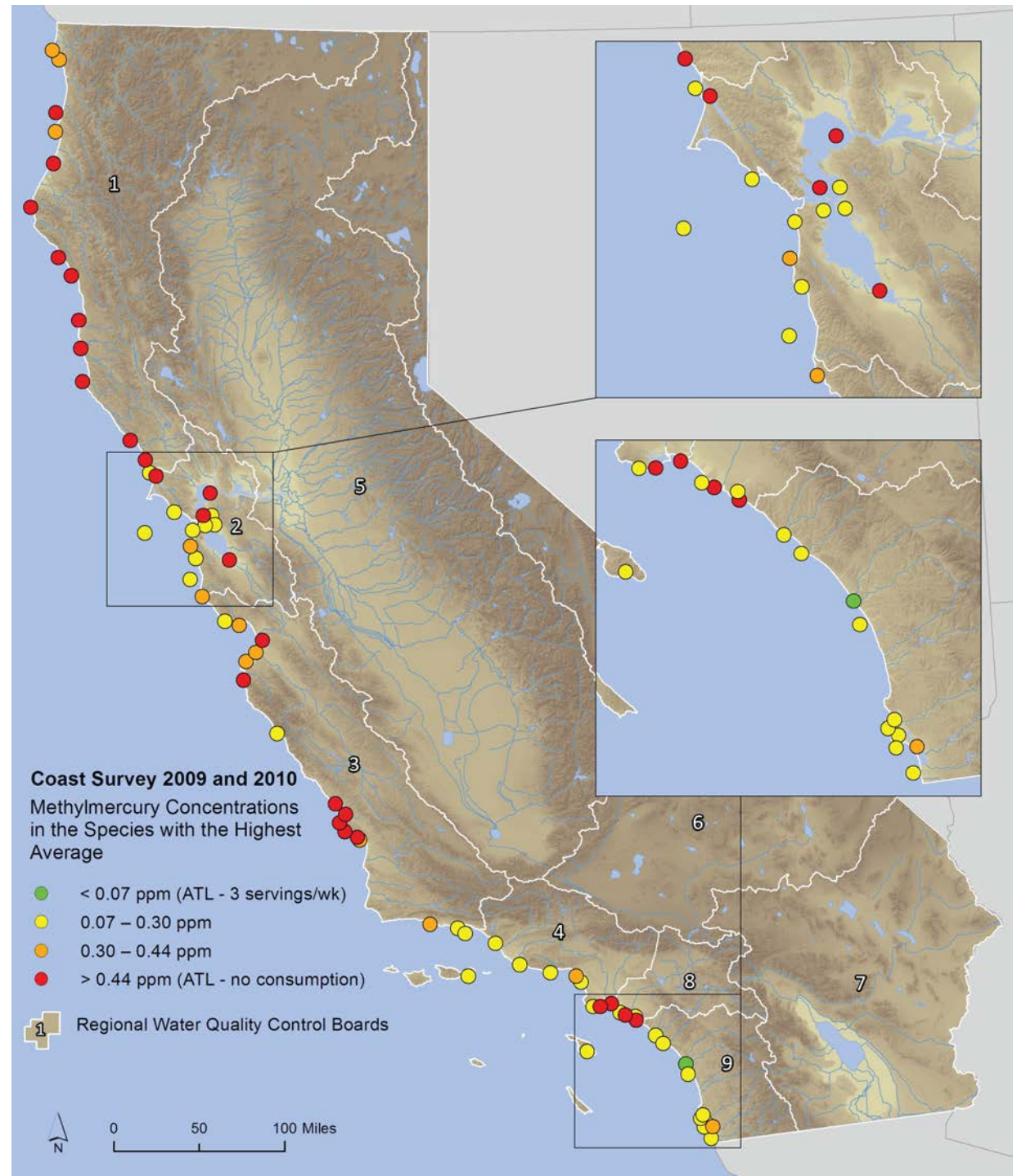
Coast Sampling – Round 2

- Recap of Round 1
 - 2 year survey
 - 68 zones (6 in SF Bay)
 - 5 species per zone
 - Hg, PCBs, OCs, Se in all species



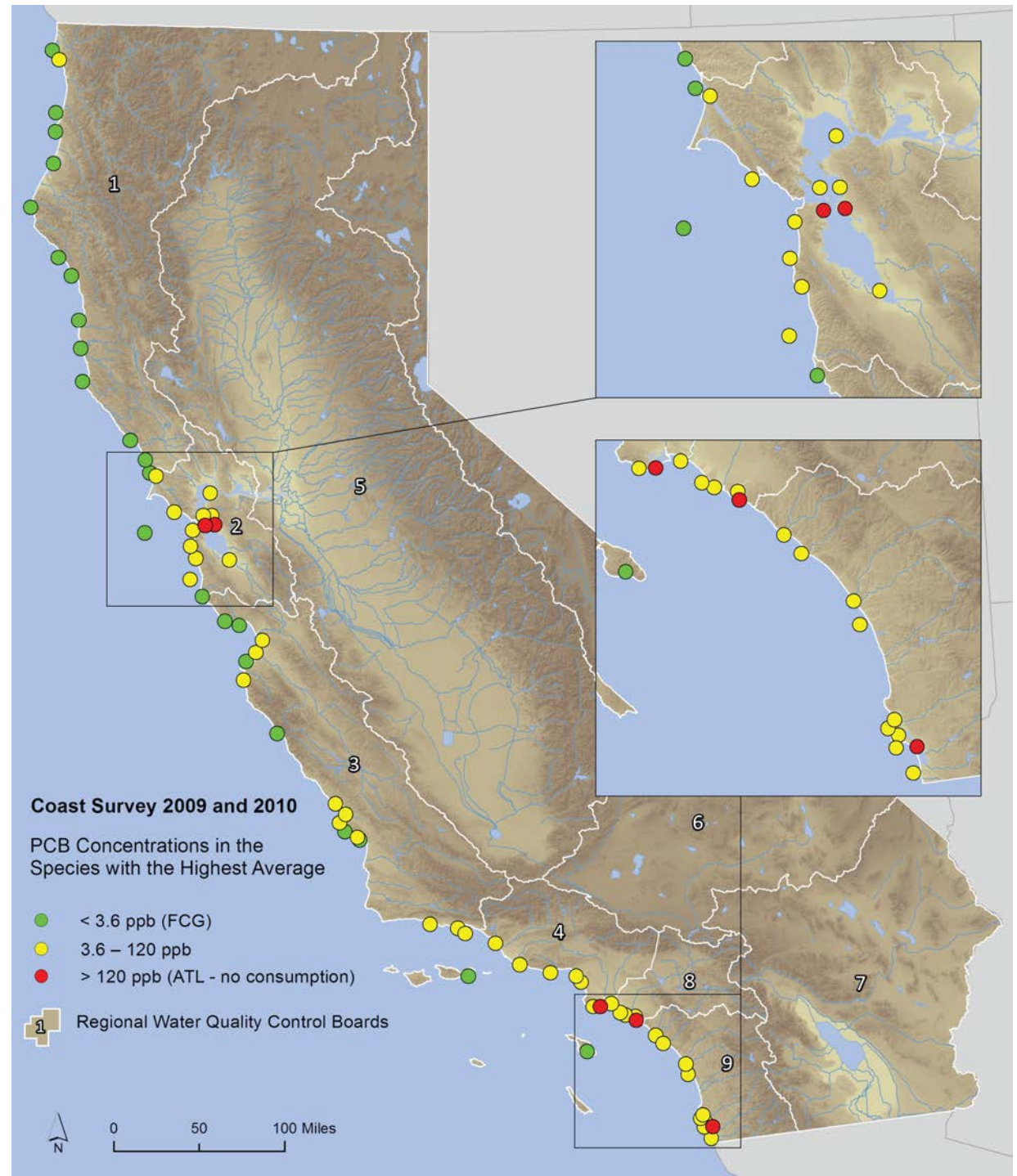
Coast Sampling – Round 2

- Recap of Round 1
 - Widespread high mercury



Coast Sampling – Round 2

- Recap of Round 1
 - Widespread high mercury
 - A few spots with high PCBs



Coast Sampling – Round 2

■ Assumptions for Round 2

- 3 years
- 62 zones (SF Bay is on its own)
- 5 species per zone

■ Bight Zones

- SWAMP: Hg in 5 species, (organics in one comp from each of two species)
- Bight Program: Organics in 5 species (including 3 replicates for 2 species)

■ Other Zones

- SWAMP: Hg in 5 species, organics in one comp from each of two species

OEHHA Data Gaps

OEHHA Recommendations for Species Collection

SPECIES	CEDEN SAMPLES (Sites)	DESIRED SAMPLES*	NOTES
<i>Finfish</i>			
California Halibut**	7(3)	23 individuals	Preferably from outside of bays and Social advisory area (Ventura Pier to Dana Point)
California Sheephead	8(2)	22 individuals from 2 locations	Need samples from spots other than Pt Loma and La Jolla kelp beds
Halfmoon**	4(1)	26 individuals from 2 locations	Halfmoon and Opaleye can be grouped together, so a combined total of 30 is acceptable
Opaleye**	20(4)	10 more individuals	
Kelp Greenling	23(6)	7 individuals	
Pacific Halibut	0	30 individuals from 3 locations	
Sharks (Shortfin Mako, Blue Shark, or Thresher)	0	30 individuals from 3 locations	
Tuna species (Albacore, Bluefin, Yellowfin, Bigeye)	0	30 individuals from 3 locations	
<i>Invertebrates</i>			
Rock Crab (Brown, Yellow)**	6(1)-Ventura Pier, 15(1)-Santa Monica	9 individuals from 1 location	We have enough Red Rock Crab
Spiny lobster	0	30 individuals from 3 locations	
Pismo Clams	0	30 individuals from 3 locations	
Littleneck Clams	5 from Humboldt (40.7685, -124.236)	25 individuals from 3 locations	

Decisions

- Have Bight do all of the organics? – potential savings of ~\$68K
 - Need to make sure we get data that are usable by WBs and OEHHA
 - Need intercalibration
- If yes, what to do with the savings?
 - More analyses in 2017, or more lakes in 2019?
 - More “why” data in Bass 2019?
 - Synthesis?



Bight '18: Next Steps

- Outline the design of an intercalibration study (summer)
- Finalize design and prepare addendum to the 2009-2010 Sampling and Analysis Plan (summer)
- Get official approval from Bight Program (Dec)
- Bight Program prepares draft workplan (Jan)



Item 8: Discussion: Revised Safe to Eat Portal

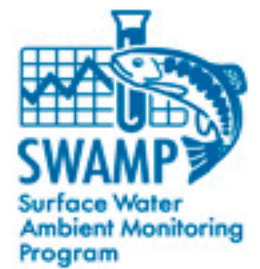
- Desired outcome: Obtain input on the Portal from the Review Panel and stakeholders via a group discussion.

Subcommittee on Communicating SWAMP Data to the Public

1. Subcommittee met in January 2016
2. Agreed on criteria
 - Simple, easy to understand
 - Convey the right message (not be misleading)
 - Consistent with existing or future OEHHA consumption advice



- Switch to Portal



Item 9: Discussion: Bioaccumulation Summary for the Water Quality Status Report

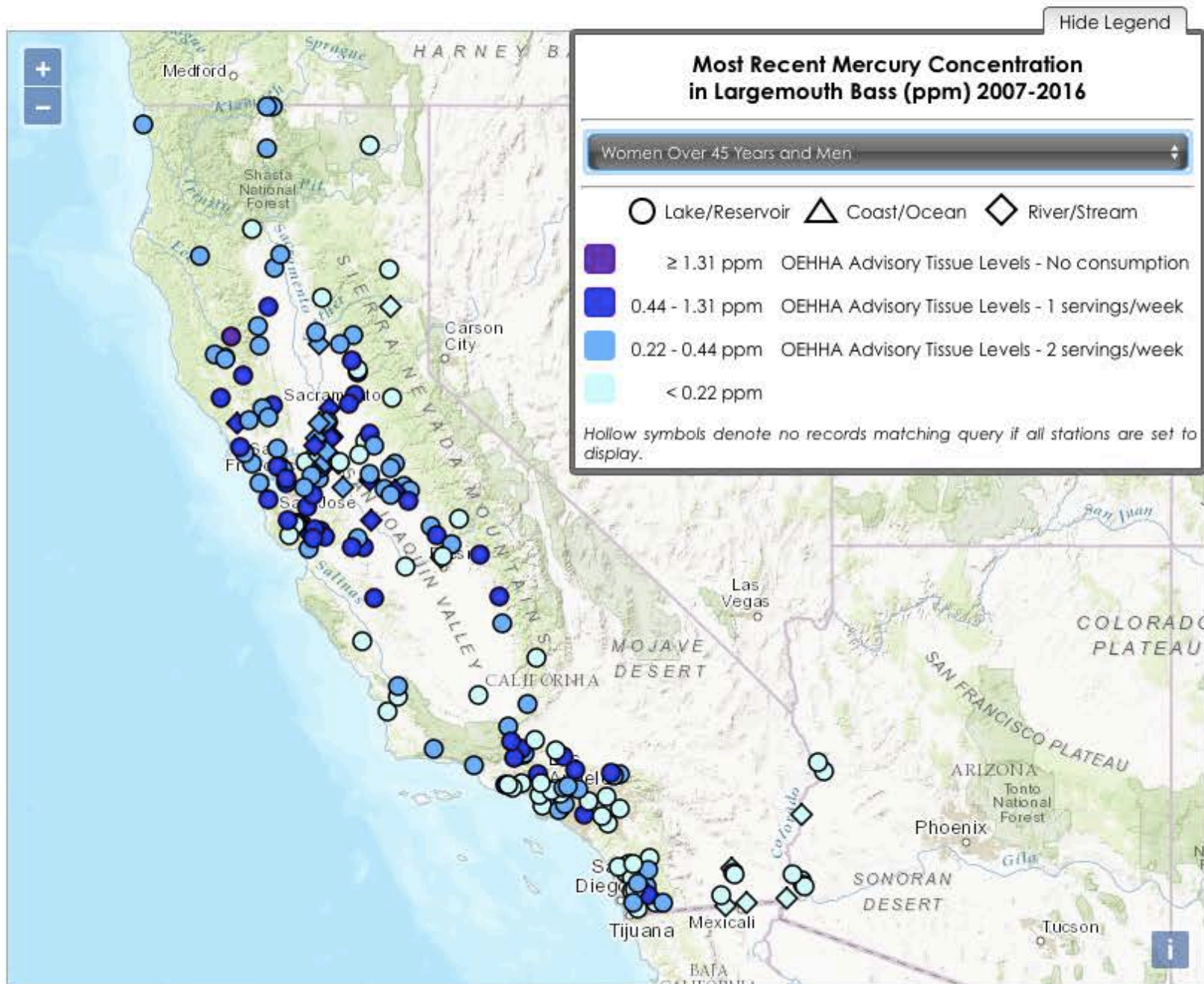
- Desired outcome: Obtain input on the summary from the Review Panel and stakeholders via a group discussion. Input will guide preparation of the final version.



Bioaccumulation Summary: Guidance

- Focus of fact sheets: What are the highest priority water quality problems in CA?
- Tie to Portal and Open Data Initiative
- Show trends over 10 yr
- Link to reservoir TMDL - baseline for TMDL
- Question of showing concs in LMB vs. where we've sampled





Item 10: Information: Timeline for 2017

- Desired outcome: The group is informed and provides input on plans for the rest of the year.



Next Steps

1. Written comments by May 4
2. Finalize technical report - June
3. Draft a fact sheet - June
4. BOG review of fact sheet
5. Finalize fact sheet



Next Steps

1. Written comments by May 4
2. Finalize data report - June
3. Draft a fact sheet - June
4. BOG review of fact sheet
5. Finalize fact sheet



Timeline for Releasing the 2016 Data

- Sampling – Completed in October 2016
- Analysis
 - Mercury – reported to SWAMP
 - Organics – reported to SWAMP
 - Aging – end of April
 - Selenium - ?
- State Board QA review and upload to CEDEN
- SFEI review and data report/fact sheet generation
- BOG review
- Upload to Portal, release fact sheet



Bight '18: Next Steps

- Outline the design of an intercalibration study (summer)
- Finalize design and prepare addendum to the 2009-2010 Sampling and Analysis Plan (summer)
- Get official approval from Bight Program (Dec)
- Bight Program prepares draft workplan (Jan)



Timeline for 2017

- Begin sampling – already started
- Review and release upgraded Portal - April
- Finalize sampling plan and QAPP – April/May
- BOG teleconference – summer
 - Bight design
 - Bight intercalibration
 - Other stuff

